Cisco AS5350XM and Cisco AS5400XM Universal Gateways Card Installation Guide

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• Turn the television or radio antenna until the interference stops.

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• Move the equipment farther away from the television or radio.

• Plug the equipment into an outlet that is on a different circuit from the television or radio. (That is, make certain the equipment and the television or radio are on circuits controlled by different circuit breakers or fuses.)

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Preface

This preface describes the objectives and organization of this document and explains how to find additional information on related products and services. This preface contains the following sections:

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Document Organization

This publication is designed for people who have some experience installing networking equipment such as routers, hubs, servers, and switches. The person who installs the server should be familiar with electronic circuitry and wiring practices and have experience as an electronic or electromechanical technician.

Table 1 describes the contents of each chapter in this document.

Table 1 Document Organization

Chapter	Title	Description
Chapter 1	Safety Warnings, Recommendations, and Tools Required	Describes the safety warnings, recommendations, and the tools required to install dial feature cards in the chassis.
Chapter 2	Feature Card and Carrier Card Guidelines	Describes the tasks you must perform to remove and install carrier cards.
Chapter 3	T1 and E1 Feature Cards	Describes online insertion and removal (OIR) tasks that you must perform on the T1 or E1 feature card.
Chapter 4	Channelized T3 Feature Card	Describes OIR tasks that you must perform on the channelized T3 (CT3) feature card.
Chapter 5	Universal Port and Dial-Only Feature Cards	Describes OIR tasks that you must perform on the universal port and dial-only feature cards.

Table 1 Document Organization (continued)

Chapter	Title	Description
Chapter 6	Voice Feature Card	Describes OIR tasks that you must perform on the voice feature card.
Chapter 7	Troubleshooting	Describes how to troubleshoot by using LEDs, bantam jacks, and environmental monitoring.
Appendix A	Cabling Specifications	Describes cabling and pinout information for the dial feature cards.

Document Conventions

This publication uses the following conventions to convey instructions and information.

Convention	Description
boldface font	Commands and keywords.
italic font	Variables for which you supply values.
[ ]	Keywords or arguments that appear within square brackets are optional.
{x | y | z}	A choice of required keywords appears in braces separated by vertical bars. You must select one.
`screen font`	Examples of information displayed on the screen.
`boldface screen font`	Examples of information you must enter.
< >	Nonprinting characters, for example passwords, appear in angle brackets in contexts where italic font is not available.
[ ]	Default responses to system prompts appear in square brackets.

Note Means *reader take note*. Notes contain helpful suggestions or references to additional information and material.

Timesaver This symbol means *the described action saves time*. You can save time by performing the action described in the paragraph.

Caution This symbol means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.

Tip This symbol means *the following information will help you solve a problem*. The tips information might not be troubleshooting or even an action, but could be useful information, similar to a Timesaver.

Warning **IMPORTANT SAFETY INSTRUCTIONS**

This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device.

SAVE THESE INSTRUCTIONS

Waarschuwing **BELANGRIJKE VEILIGHEIDSINSTRUCTIES**

Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van de standaard praktijken om ongelukken te voorkomen. Gebruik het nummer van de verklaring onderaan de waarschuwing als u een vertaling van de waarschuwing die bij het apparaat wordt geleverd, wilt raadplegen.

BEWAAR DEZE INSTRUCTIES

Varoitus **TÄRKEITÄ TURVALLISUUSOHJEITA**

Tämä varoitusmerkki merkitsee vaaraa. Tilanne voi aiheuttaa ruumiillisia vammoja. Ennen kuin käsittelet laitteistoa, huomioi sähköpiirien käsittelemiseen liittyvät riskit ja tutustu onnettomuuksien yleisiin ehkäisytapoihin. Turvallisuusvaroitusten käännökset löytyvät laitteen mukana toimitettujen käännettyjen turvallisuusvaroitusten joukosta varoitusten lopussa näkyvien lausuntonumeroiden avulla.

SÄILYTÄ NÄMÄ OHJEET

Attention **IMPORTANTES INFORMATIONS DE SÉCURITÉ**

Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant entraîner des blessures ou des dommages corporels. Avant de travailler sur un équipement, soyez conscient des dangers liés aux circuits électriques et familiarisez-vous avec les procédures couramment utilisées pour éviter les accidents. Pour prendre connaissance des traductions des avertissements figurant dans les consignes de sécurité traduites qui accompagnent cet appareil, référez-vous au numéro de l'instruction situé à la fin de chaque avertissement.

CONSERVEZ CES INFORMATIONS

Warnung **WICHTIGE SICHERHEITSHINWEISE**

Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu Verletzungen führen kann. Machen Sie sich vor der Arbeit mit Geräten mit den Gefahren elektrischer Schaltungen und den üblichen Verfahren zur Vorbeugung vor Unfällen vertraut. Suchen Sie mit der am Ende jeder Warnung angegebenen Anweisungsnummer nach der jeweiligen Übersetzung in den übersetzten Sicherheitshinweisen, die zusammen mit diesem Gerät ausgeliefert wurden.

BEWAHREN SIE DIESE HINWEISE GUT AUF.

Avvertenza **IMPORTANTI ISTRUZIONI SULLA SICUREZZA**

Questo simbolo di avvertenza indica un pericolo. La situazione potrebbe causare infortuni alle persone. Prima di intervenire su qualsiasi apparecchiatura, occorre essere al corrente dei pericoli relativi ai circuiti elettrici e conoscere le procedure standard per la prevenzione di incidenti. Utilizzare il numero di istruzione presente alla fine di ciascuna avvertenza per individuare le traduzioni delle avvertenze riportate in questo documento.

CONSERVARE QUESTE ISTRUZIONI

Advarsel **VIKTIGE SIKKERHETSINSTRUKSJONER**

Dette advarselssymbolet betyr fare. Du er i en situasjon som kan føre til skade på person. Før du begynner å arbeide med noe av utstyret, må du være oppmerksom på farene forbundet med elektriske kretser, og kjenne til standardprosedyrer for å forhindre ulykker. Bruk nummeret i slutten av hver advarsel for å finne oversettelsen i de oversatte sikkerhetsadvarslene som fulgte med denne enheten.

TA VARE PÅ DISSE INSTRUKSJONENE

Aviso **INSTRUÇÕES IMPORTANTES DE SEGURANÇA**

Este símbolo de aviso significa perigo. Você está em uma situação que poderá ser causadora de lesões corporais. Antes de iniciar a utilização de qualquer equipamento, tenha conhecimento dos perigos envolvidos no manuseio de circuitos elétricos e familiarize-se com as práticas habituais de prevenção de acidentes. Utilize o número da instrução fornecido ao final de cada aviso para localizar sua tradução nos avisos de segurança traduzidos que acompanham este dispositivo.

GUARDE ESTAS INSTRUÇÕES

¡Advertencia! **INSTRUCCIONES IMPORTANTES DE SEGURIDAD**

Este símbolo de aviso indica peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considere los riesgos de la corriente eléctrica y familiarícese con los procedimientos estándar de prevención de accidentes. Al final de cada advertencia encontrará el número que le ayudará a encontrar el texto traducido en el apartado de traducciones que acompaña a este dispositivo.

GUARDE ESTAS INSTRUCCIONES

Varning! **VIKTIGA SÄKERHETSANVISNINGAR**

Denna varningssignal signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på någon utrustning måste du vara medveten om farorna med elkretsar och känna till vanliga förfaranden för att förebygga olyckor. Använd det nummer som finns i slutet av varje varning för att hitta dess översättning i de översatta säkerhetsvarningar som medföljer denna anordning.

SPARA DESSA ANVISNINGAR

Figyelem **FONTOS BIZTONSÁGI ELOÍRÁSOK**

Ez a figyelmezeto jel veszélyre utal. Sérülésveszélyt rejto helyzetben van. Mielott bármely berendezésen munkát végezte, legyen figyelemmel az elektromos áramkörök okozta kockázatokra, és ismerkedjen meg a szokásos balesetvédelmi eljárásokkal. A kiadványban szereplo figyelmeztetések fordítása a készülékhez mellékelt biztonsági figyelmeztetések között található; a fordítás az egyes figyelmeztetések végén látható szám alapján keresheto meg.

ORIZZE MEG EZEKET AZ UTASÍTÁSOKAT!

Предупреждение **ВАЖНЫЕ ИНСТРУКЦИИ ПО СОБЛЮДЕНИЮ ТЕХНИКИ БЕЗОПАСНОСТИ**

Этот символ предупреждения обозначает опасность. То есть имеет место ситуация, в которой следует опасаться телесных повреждений. Перед эксплуатацией оборудования выясните, каким опасностям может подвергаться пользователь при использовании электрических цепей, и ознакомьтесь с правилами техники безопасности для предотвращения возможных несчастных случаев. Воспользуйтесь номером заявления, приведенным в конце каждого предупреждения, чтобы найти его переведенный вариант в переводе предупреждений по безопасности, прилагаемом к данному устройству.

СОХРАНИТЕ ЭТИ ИНСТРУКЦИИ

警告 重要的安全性说明

此警告符号代表危险。您正处于可能受到严重伤害的工作环境中。在您使用设备开始工作之前，必须充分意识到触电的危险，并熟练掌握防止事故发生的标准工作程序。请根据每项警告结尾提供的声明号码来找到此设备的安全性警告说明的翻译文本。

请保存这些安全性说明

警告 安全上の重要な注意事項

「危険」の意味です。人身事故を予防するための注意事項が記述されています。装置の取り扱い作業を行うときは、電気回路の危険性に注意し、一般的な事故防止策に留意してください。警告の各国語版は、各注意事項の番号を基に、装置に付属の「Translated Safety Warnings」を参照してください。

これらの注意事項を保管しておいてください。

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이 지시 사항을 보관하십시오.

Aviso **INSTRUÇÕES IMPORTANTES DE SEGURANÇA**

Este símbolo de aviso significa perigo. Você se encontra em uma situação em que há risco de lesões corporais. Antes de trabalhar com qualquer equipamento, esteja ciente dos riscos que envolvem os circuitos elétricos e familiarize-se com as práticas padrão de prevenção de acidentes. Use o número da declaração fornecido ao final de cada aviso para localizar sua tradução nos avisos de segurança traduzidos que acompanham o dispositivo.

GUARDE ESTAS INSTRUÇÕES

Advarsel **VIGTIGE SIKKERHEDSANVISNINGER**

Dette advarselssymbol betyder fare. Du befinder dig i en situation med risiko for legemesbeskadigelse. Før du begynder arbejde på udstyr, skal du være opmærksom på de involverede risici, der er ved elektriske kredsløb, og du skal sætte dig ind i standardprocedurer til undgåelse af ulykker. Brug erklæringsnummeret efter hver advarsel for at finde oversættelsen i de oversatte advarsler, der fulgte med denne enhed.

GEM DISSE ANVISNINGER

تحذير **إرشادات الأمان الهامة**

يوضح رمز التحذير هذا وجود خطر. وهذا يعني أنك متواجد في مكان قد ينتج عنه التعرض لإصابات. قبل بدء العمل، احذر مخاطر التعرض للصدمات الكهربائية وكن على علم بالإجراءات القياسية للحيلولة دون وقوع أي حوادث. استخدم رقم البيان الموجود في أخر كل تحذير لتحديد مكان ترجمته داخل تحذيرات الأمان المترجمة التي تأتي مع الجهاز.

قم بحفظ هذه الإرشادات

Upozorenje **VAŽNE SIGURNOSNE NAPOMENE**

Ovaj simbol upozorenja predstavlja opasnost. Nalazite se u situaciji koja može prouzročiti tjelesne ozljede. Prije rada s bilo kojim uređajem, morate razumjeti opasnosti vezane uz električne sklopove, te biti upoznati sa standardnim načinima izbjegavanja nesreća. U prevedenim sigurnosnim upozorenjima, priloženima uz uređaj, možete prema broju koji se nalazi uz pojedino upozorenje pronaći i njegov prijevod.

SAČUVAJTE OVE UPUTE

Upozornění **DŮLEŽITÉ BEZPEČNOSTNÍ POKYNY**

Tento upozorňující symbol označuje nebezpečí. Jste v situaci, která by mohla způsobit nebezpečí úrazu. Před prací na jakémkoliv vybavení si uvědomte nebezpečí související s elektrickými obvody a seznamte se se standardními opatřeními pro předcházení úrazům. Podle čísla na konci každého upozornění vyhledejte jeho překlad v přeložených bezpečnostních upozorněních, která jsou přiložena k zařízení.

USCHOVEJTE TYTO POKYNY

Προειδοποίηση

ΣΗΜΑΝΤΙΚΕΣ ΟΔΗΓΙΕΣ ΑΣΦΑΛΕΙΑΣ

Αυτό το προειδοποιητικό σύμβολο σημαίνει κίνδυνο. Βρίσκεστε σε κατάσταση που μπορεί να προκαλέσει τραυματισμό. Πριν εργαστείτε σε οποιοδήποτε εξοπλισμό, να έχετε υπόψη σας τους κινδύνους που σχετίζονται με τα ηλεκτρικά κυκλώματα και να έχετε εξοικειωθεί με τις συνήθεις πρακτικές για την αποφυγή ατυχημάτων. Χρησιμοποιήστε τον αριθμό δήλωσης που παρέχεται στο τέλος κάθε προειδοποίησης, για να εντοπίσετε τη μετάφρασή της στις μεταφρασμένες προειδοποιήσεις ασφαλείας που συνοδεύουν τη συσκευή.

ΦΥΛΑΞΤΕ ΑΥΤΕΣ ΤΙΣ ΟΔΗΓΙΕΣ

אזהרה

הוראות בטיחות חשובות

סימן אזהרה זה מסמל סכנה. אתה נמצא במצב העלול לגרום לפציעה. לפני שתעבוד עם ציוד כלשהו, עליך להיות מודע לסכנות הכרוכות במעגלים חשמליים ולהכיר את הנהלים המקובלים למניעת תאונות. השתמש במספר ההוראה המסופק בסופה של כל אזהרה כד לאתר את התרגום באזהרות הבטיחות המתורגמות שמצורפות להתקן.

שמור הוראות אלה

Opomena

ВАЖНИ БЕЗБЕДНОСНИ НАПАТСТВИЈА

Симболот за предупредување значи опасност. Се наоѓате во ситуација што може да предизвика телесни повреди. Пред да работите со опремата, бидете свесни за ризикот што постои кај електричните кола и треба да ги познавате стандардните постапки за спречување на несреќни случаи. Искористете го бројот на изјавата што се наоѓа на крајот на секое предупредување за да го најдете неговиот период во преведените безбедносни предупредувања што се испорачани со уредот.

ЧУВАЈТЕ ГИ ОВИЕ НАПАТСТВИЈА

Ostrzeżenie

WAŻNE INSTRUKCJE DOTYCZĄCE BEZPIECZEŃSTWA

Ten symbol ostrzeżenia oznacza niebezpieczeństwo. Zachodzi sytuacja, która może powodować obrażenia ciała. Przed przystąpieniem do prac przy urządzeniach należy zapoznać się z zagrożeniami związanymi z układami elektrycznymi oraz ze standardowymi środkami zapobiegania wypadkom. Na końcu każdego ostrzeżenia podano numer, na podstawie którego można odszukać tłumaczenie tego ostrzeżenia w dołączonym do urządzenia dokumencie z tłumaczeniami ostrzeżeń.

NINIEJSZE INSTRUKCJE NALEŻY ZACHOWAĆ

Upozornenie

DÔLEŽITÉ BEZPEČNOSTNÉ POKYNY

Tento varovný symbol označuje nebezpečenstvo. Nachádzate sa v situácii s nebezpečenstvom úrazu. Pred prácou na akomkoľvek vybavení si uvedomte nebezpečenstvo súvisiace s elektrickými obvodmi a oboznámte sa so štandardnými opatreniami na predchádzanie úrazom. Podľa čísla na konci každého upozornenia vyhľadajte jeho preklad v preložených bezpečnostných upozorneniach, ktoré sú priložené k zariadeniu.

USCHOVAJTE SI TENTO NÁVOD

Obtaining Documentation

Cisco documentation and additional literature are available on Cisco.com. Cisco also provides several ways to obtain technical assistance and other technical resources. These sections explain how to obtain technical information from Cisco Systems.

Cisco.com

You can access the most current Cisco documentation at this URL:

http://www.cisco.com/techsupport

You can access the Cisco website at this URL:

http://www.cisco.com

You can access international Cisco websites at this URL:

http://www.cisco.com/public/countries_languages.shtml

Product Documentation DVD

The Product Documentation DVD is a comprehensive library of technical product documentation on a portable medium. The DVD enables you to access multiple versions of installation, configuration, and command guides for Cisco hardware and software products. With the DVD, you have access to the same HTML documentation that is found on the Cisco website without being connected to the Internet. Certain products also have .PDF versions of the documentation available.

The Product Documentation DVD is available as a single unit or as a subscription. Registered Cisco.com users (Cisco direct customers) can order a Product Documentation DVD (product number DOC-DOCDVD= or DOC-DOCDVD=SUB) from Cisco Marketplace at this URL:

http://www.cisco.com/go/marketplace/

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Registered Cisco.com users may order Cisco documentation at the Product Documentation Store in the Cisco Marketplace at this URL:

http://www.cisco.com/go/marketplace/

Nonregistered Cisco.com users can order technical documentation from 8:00 a.m. to 5:00 p.m. (0800 to 1700) PDT by calling 1 866 463-3487 in the United States and Canada, or elsewhere by calling 011 408 519-5055. You can also order documentation by e-mail at tech-doc-store-mkpl@external.cisco.com or by fax at 1 408 519-5001 in the United States and Canada, or elsewhere at 011 408 519-5001.

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You can rate and provide feedback about Cisco technical documents by completing the online feedback form that appears with the technical documents on Cisco.com.

You can submit comments about Cisco documentation by using the response card (if present) behind the front cover of your document or by writing to the following address:

Cisco Systems
Attn: Customer Document Ordering
170 West Tasman Drive
San Jose, CA 95134-9883

We appreciate your comments.

Cisco Product Security Overview

Cisco provides a free online Security Vulnerability Policy portal at this URL:

http://www.cisco.com/en/US/products/products_security_vulnerability_policy.html

From this site, you will find information about how to:

- Report security vulnerabilities in Cisco products.
- Obtain assistance with security incidents that involve Cisco products.
- Register to receive security information from Cisco.

A current list of security advisories, security notices, and security responses for Cisco products is available at this URL:

http://www.cisco.com/go/psirt

To see security advisories, security notices, and security responses as they are updated in real time, you can subscribe to the Product Security Incident Response Team Really Simple Syndication (PSIRT RSS) feed. Information about how to subscribe to the PSIRT RSS feed is found at this URL:

http://www.cisco.com/en/US/products/products_psirt_rss_feed.html

Reporting Security Problems in Cisco Products

Cisco is committed to delivering secure products. We test our products internally before we release them, and we strive to correct all vulnerabilities quickly. If you think that you have identified a vulnerability in a Cisco product, contact PSIRT:

- For Emergencies only—security-alert@cisco.com

  An emergency is either a condition in which a system is under active attack or a condition for which a severe and urgent security vulnerability should be reported. All other conditions are considered nonemergencies.

- For Nonemergencies—psirt@cisco.com

In an emergency, you can also reach PSIRT by telephone:

- 1 877 228-7302
- 1 408 525-6532

Tip We encourage you to use Pretty Good Privacy (PGP) or a compatible product (for example, GnuPG) to encrypt any sensitive information that you send to Cisco. PSIRT can work with information that has been encrypted with PGP versions 2.*x* through 9.*x*.

Never use a revoked or an expired encryption key. The correct public key to use in your correspondence with PSIRT is the one linked in the Contact Summary section of the Security Vulnerability Policy page at this URL:

http://www.cisco.com/en/US/products/products_security_vulnerability_policy.html

The link on this page has the current PGP key ID in use.

If you do not have or use PGP, contact PSIRT at the aforementioned e-mail addresses or phone numbers before sending any sensitive material to find other means of encrypting the data.

Obtaining Technical Assistance

Cisco Technical Support provides 24-hour-a-day award-winning technical assistance. The Cisco Technical Support & Documentation website on Cisco.com features extensive online support resources. In addition, if you have a valid Cisco service contract, Cisco Technical Assistance Center (TAC) engineers provide telephone support. If you do not have a valid Cisco service contract, contact your reseller.

Cisco Technical Support & Documentation Website

The Cisco Technical Support & Documentation website provides online documents and tools for troubleshooting and resolving technical issues with Cisco products and technologies. The website is available 24 hours a day, at this URL:

http://www.cisco.com/techsupport

Access to all tools on the Cisco Technical Support & Documentation website requires a Cisco.com user ID and password. If you have a valid service contract but do not have a user ID or password, you can register at this URL:

http://tools.cisco.com/RPF/register/register.do

Note Use the Cisco Product Identification (CPI) tool to locate your product serial number before submitting a web or phone request for service. You can access the CPI tool from the Cisco Technical Support & Documentation website by clicking the **Tools & Resources** link under Documentation & Tools. Choose **Cisco Product Identification Tool** from the Alphabetical Index drop-down list, or click the **Cisco Product Identification Tool** link under Alerts & RMAs. The CPI tool offers three search options: by product ID or model name; by tree view; or for certain products, by copying and pasting **show** command output. Search results show an illustration of your product with the serial number label location highlighted. Locate the serial number label on your product and record the information before placing a service call.

Submitting a Service Request

Using the online TAC Service Request Tool is the fastest way to open S3 and S4 service requests. (S3 and S4 service requests are those in which your network is minimally impaired or for which you require product information.) After you describe your situation, the TAC Service Request Tool provides recommended solutions. If your issue is not resolved using the recommended resources, your service request is assigned to a Cisco engineer. The TAC Service Request Tool is located at this URL:

http://www.cisco.com/techsupport/servicerequest

For S1 or S2 service requests, or if you do not have Internet access, contact the Cisco TAC by telephone. (S1 or S2 service requests are those in which your production network is down or severely degraded.) Cisco engineers are assigned immediately to S1 and S2 service requests to help keep your business operations running smoothly.

To open a service request by telephone, use one of the following numbers:

Asia-Pacific: +61 2 8446 7411 (Australia: 1 800 805 227)
EMEA: +32 2 704 55 55
USA: 1 800 553-2447

For a complete list of Cisco TAC contacts, go to this URL:

http://www.cisco.com/techsupport/contacts

Definitions of Service Request Severity

To ensure that all service requests are reported in a standard format, Cisco has established severity definitions.

Severity 1 (S1)—An existing network is down, or there is a critical impact to your business operations. You and Cisco will commit all necessary resources around the clock to resolve the situation.

Severity 2 (S2)—Operation of an existing network is severely degraded, or significant aspects of your business operations are negatively affected by inadequate performance of Cisco products. You and Cisco will commit full-time resources during normal business hours to resolve the situation.

Severity 3 (S3)—Operational performance of the network is impaired, while most business operations remain functional. You and Cisco will commit resources during normal business hours to restore service to satisfactory levels.

Severity 4 (S4)—You require information or assistance with Cisco product capabilities, installation, or configuration. There is little or no effect on your business operations.

Obtaining Additional Publications and Information

Information about Cisco products, technologies, and network solutions is available from various online and printed sources.

- The *Cisco Product Quick Reference Guide* is a handy, compact reference tool that includes brief product overviews, key features, sample part numbers, and abbreviated technical specifications for many Cisco products that are sold through channel partners. It is updated twice a year and includes the latest Cisco offerings. To order and find out more about the Cisco Product Quick Reference Guide, go to this URL:

  http://www.cisco.com/go/guide

- Cisco Marketplace provides a variety of Cisco books, reference guides, documentation, and logo merchandise. Visit Cisco Marketplace, the company store, at this URL:

  http://www.cisco.com/go/marketplace/

- *Cisco Press* publishes a wide range of general networking, training and certification titles. Both new and experienced users will benefit from these publications. For current Cisco Press titles and other information, go to Cisco Press at this URL:

  http://www.ciscopress.com

- *Packet* magazine is the Cisco Systems technical user magazine for maximizing Internet and networking investments. Each quarter, Packet delivers coverage of the latest industry trends, technology breakthroughs, and Cisco products and solutions, as well as network deployment and troubleshooting tips, configuration examples, customer case studies, certification and training information, and links to scores of in-depth online resources. You can access Packet magazine at this URL:

  http://www.cisco.com/packet

- *iQ Magazine* is the quarterly publication from Cisco Systems designed to help growing companies learn how they can use technology to increase revenue, streamline their business, and expand services. The publication identifies the challenges facing these companies and the technologies to help solve them, using real-world case studies and business strategies to help readers make sound technology investment decisions. You can access iQ Magazine at this URL:

  http://www.cisco.com/go/iqmagazine

  or view the digital edition at this URL:

  http://ciscoiq.texterity.com/ciscoiq/sample/

- *Internet Protocol Journal* is a quarterly journal published by Cisco Systems for engineering professionals involved in designing, developing, and operating public and private internets and intranets. You can access the Internet Protocol Journal at this URL:

  http://www.cisco.com/ipj

- Networking products offered by Cisco Systems, as well as customer support services, can be obtained at this URL:

  http://www.cisco.com/en/US/products/index.html

- Networking Professionals Connection is an interactive website for networking professionals to share questions, suggestions, and information about networking products and technologies with Cisco experts and other networking professionals. Join a discussion at this URL:

  http://www.cisco.com/discuss/networking

- World-class networking training is available from Cisco. You can view current offerings at this URL:

  http://www.cisco.com/en/US/learning/index.html

Safety Warnings, Recommendations, and Tools Required

This chapter describes the safety warnings, recommendations, and tools required to install feature cards in the chassis. This chapter contains the following sections:

- General Safety, page 1-1
- Maintaining Safety with Electricity, page 1-2
- Preventing Electrostatic Discharge, page 1-3
- Required Tools and Equipment, page 1-3
- Where to Go Next, page 1-4

General Safety

Any device that uses electricity must be handled carefully; follow these guidelines to ensure general safety:

- Keep the chassis area clear and dust-free during and after installation.
- Put the removed chassis cover in a safe place.
- Keep tools away from walk areas where you and others could fall over them.
- Do not wear loose clothing that could get caught in the chassis. Fasten your tie or scarf and roll up your sleeves.
- Wear safety glasses if you are working under any conditions that might be hazardous to your eyes.
- Do not perform any action that creates a potential hazard to people or makes the equipment unsafe.

Warning **Ultimate disposal of this product should be handled according to all national laws and regulations.** Statement 1040

Maintaining Safety with Electricity

Warning **Before working on equipment that is connected to power lines, remove jewelry (including rings, necklaces, and watches). Metal objects will heat up when connected to power and ground and can cause serious burns or weld the metal object to the terminals.** Statement 43

Follow these guidelines when you work on equipment powered by electricity.

- Locate the emergency power-OFF switch for the room in which you are working. Then, if an electrical accident occurs, you can act quickly to turn OFF the power.
- Before working on the system, unplug the power cord.
- Disconnect all power before doing the following:
  - Installing or removing a feature card
  - Working near power supplies

Warning **When installing or replacing the unit, the ground connection must always be made first and disconnected last.** Statement 1046

- Do not work alone if potentially hazardous conditions exist.
- Never assume that power is disconnected from a circuit. Always check.

Warning **Read the installation instructions before connecting the system to the power source.** Statement 1004

- Look carefully for possible hazards in your work area, such as moist floors, ungrounded power extension cables, frayed power cords, and missing safety ground connections.
- If an electrical accident occurs, proceed as follows:
  - Use caution; do not become a victim yourself.
  - Turn OFF power to the system.
  - If possible, send another person to get medical aid. Otherwise, assess the condition of the victim and then call for help.
  - Determine if the person needs rescue breathing or external cardiac compressions; then take appropriate action.

Warning **This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that a fuse or circuit breaker no larger than 120 VAC, 15A U.S. (240 VAC, 10A international) is used on the phase conductors (all current-carrying conductors).** Statement 13

Preventing Electrostatic Discharge

Electrostatic discharge (ESD) can damage equipment and impair electrical circuitry. ESD damage occurs when electronic components are improperly handled and can result in complete or intermittent failures.

Always follow ESD-prevention procedures when you remove and replace components. Ensure that the chassis is electrically connected to earth ground. Wear an ESD-preventive wrist strap, ensuring that it makes good skin contact. Connect the grounding clip to an unpainted surface of the chassis frame to safely ground unwanted ESD voltages. To guard against ESD damage and shocks, the wrist strap and cord must operate properly. If no wrist strap is available, ground yourself by touching the metal part of the chassis.

For safety, periodically check the resistance value of the antistatic strap, which should be between 1 and 10 megohm (Mohm).

Required Tools and Equipment

The following items are provided with each universal gateway:

- RJ-45-to-DB-9 female DTE adapter (labeled TERMINAL)
- RJ-45-to-DB-25 female DTE adapter (labeled TERMINAL)
- RJ-45-to-DB-25 male DCE adapter (labeled MODEM)
- RJ-45-to-RJ-45 rollover console cable
- ESD-preventive wrist strap
- Nylon cable tie
- Cable tie holder
- Grounding lug
- Alarm connector

You might need the following equipment, which is not provided with the universal gateway:

- Straight-through RJ-45-to-RJ-45 cable for an Ethernet connection
- Ethernet hub or PC with a network interface card for Ethernet LAN connections
- One breakout cable consisting of a 36-pin connector connected to eight RJ-45 adapters for CT1 or CE1 connections
- Straight-through RJ-45-to-RJ-45 cable for CT1 or CE1 connections
- 75-ohm coaxial cable for a CT3 connection
- PC that is running terminal emulation software for local administrative access
- Modem for remote administrative access
- ESD-preventive mat
- Blank feature card panel

Where to Go Next

The remaining chapters of this guide provide information about installing and troubleshooting feature cards and about building cables.

- Chapter 2, "Feature Card and Carrier Card Guidelines"
- Chapter 3, "T1 and E1 Feature Cards"
- Chapter 4, "Channelized T3 Feature Card"
- Chapter 5, "Universal Port and Dial-Only Feature Cards"
- Chapter 6, "Voice Feature Card"
- Chapter 7, "Troubleshooting"
- Appendix A, "Cabling Specifications"

Feature Card and Carrier Card Guidelines

This chapter includes the following sections:

- Overview, page 2-1
- Online Insertion and Removal of Feature Cards, page 2-2
- Removing and Installing Populated Carrier Cards, page 2-2
- Getting Help, page 2-7
- Where to Go Next, page 2-7

Overview

Cisco AS5350XM Chassis

The Cisco AS5350XM universal gateway chassis has a motherboard, a high-speed backplane, and three slots for feature cards that allow online insertion and removal (OIR).

Cisco AS5400XM Chassis

The Cisco AS5400XM universal gateway chassis has a motherboard, a high-speed backplane, and seven slots for feature cards that allow OIR.

Feature Cards

Each feature card is a 5.1- by 13-inch (13- by 30-cm) PCI-based interface board.

The following trunk types are supported:

- T1 feature card—Supports North American robbed-bit signaling (RBS) on T1 trunks, including a variety of North American RBS protocol, framing, and encoding types.
- E1 feature card—Supports channel-associated signaling (CAS) for E1 trunks, with R2 signaling. Many countries require an E1 R2 variant. Per-country defaults are provided for supervisory and inter-register signaling.
- Channelized T3 (CT3) feature card—Provides physical line termination for a channelized T3 ingress trunk line, and uses an onboard multiplexer to multiplex 28 channelized T1 lines into a single channelized T3 line.

The following access types are supported:

- Universal port feature card—Converts voice, fax, and dial calls into IP packets or frames by using the Nextport digital signal processor (DSP) modules.
- Dial-only feature card—Converts dial calls into IP packets or frames by using the Nextport digital signal processor (DSP) modules.
- Voice feature card—Converts voice and fax calls into IP packets or frames by using packet fax or voice digital signal processor (DSP) modules (PVDM2).

Online Insertion and Removal of Feature Cards

All feature cards on the Cisco AS5350XM and Cisco AS5400XM chassis support OIR (also known as hot swapping). You can install, remove, replace, and rearrange the feature cards without turning off the chassis power.

When the chassis detects that a feature card is installed or removed, it automatically runs diagnostic and discovery routines, acknowledges the presence or absence of the feature card, and resumes chassis operation without any operator intervention.

See the following chapters for more information about specific feature cards:

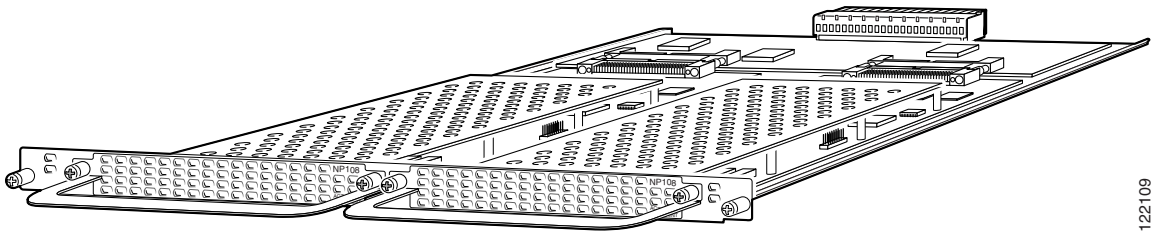
- See Chapter 3, “T1 and E1 Feature Cards,” to perform OIR of the T1 or E1 feature card.
- See Chapter 4, “Channelized T3 Feature Card,” to perform OIR of the CT3 feature card.
- See Chapter 5, “Universal Port and Dial-Only Feature Cards,” to perform OIR of the universal port or dial-only feature card.
- See Chapter 6, “Voice Feature Card,” to perform OIR of the voice feature card.

Removing and Installing Populated Carrier Cards

Caution The carrier cards that carry the feature cards are not hot-swappable. Removing a card while the system is still powered on may cause permanent damage to electronic circuits on the card.

The feature card carrier card plugs into one of the backplane slots and supports two feature cards. The carrier card increases backplane capacity and allows OIR of the feature cards. (See Figure 2-1.)

Figure 2-1 Carrier Card with Two Feature Cards Installed



Warning **Before working on a chassis or working near power supplies, unplug the power cord on AC units; disconnect the power at the circuit breaker on DC units.** Statement 12

Warning **Before performing any of the following procedures, ensure that power is removed from the DC circuit.** Statement 1003

Warning **Before connecting or disconnecting ground or power wires to the chassis, ensure that power is removed from the DC circuit. To ensure that all power is OFF, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the OFF position, and tape the switch handle of the circuit breaker in the OFF position.** Statement 140

Caution Before you remove a carrier card, see Chapter 1, "Safety Warnings, Recommendations, and Tools Required."

Removing a Populated Carrier Card

Warning **Before opening the unit, disconnect the telephone-network cables to avoid contact with telephone-network voltages.** Statement 1041

Warning **Do not work on the system or connect or disconnect cables during periods of lightning activity.** Statement 1001

To remove a populated carrier card, follow the steps below:

Step 1 Power down the chassis.

Step 2 Disconnect all interface cables from the universal gateway, and secure them out of the way.

Step 3 Loosen the two captive screws that secure the carrier card to the chassis until each screw is free of the chassis. (See Figure 2-2 and Figure 2-3.)

Figure 2-2 Loosening the Captive Screws on the Cisco AS5350XM

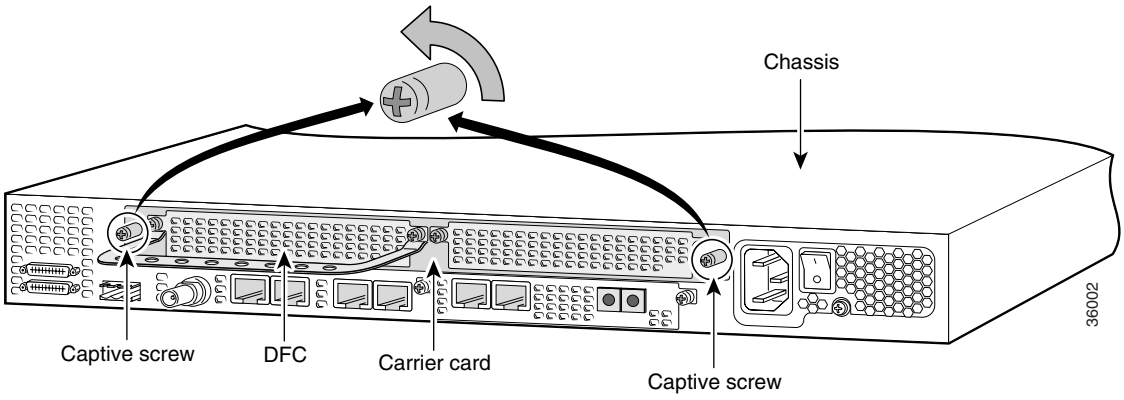
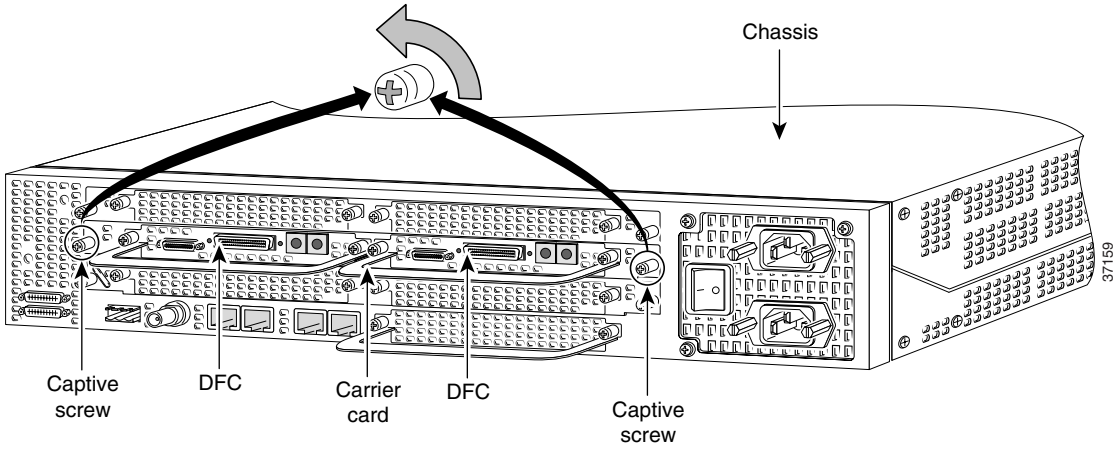


Figure 2-3 Loosening the Captive Screws on the Cisco AS5400XM



Step 4 Grasp the feature card handles and gently pull them toward you to guide the carrier card out of the slot. Place one hand under the carrier card as you pull it out of the chassis. (See Figure 2-4 and Figure 2-5.)

Note Use the feature card handles to remove the carrier card. Ensure that the feature cards are secured to the carrier card.

Figure 2-4 Removing the Carrier Card from the Cisco AS5350XM

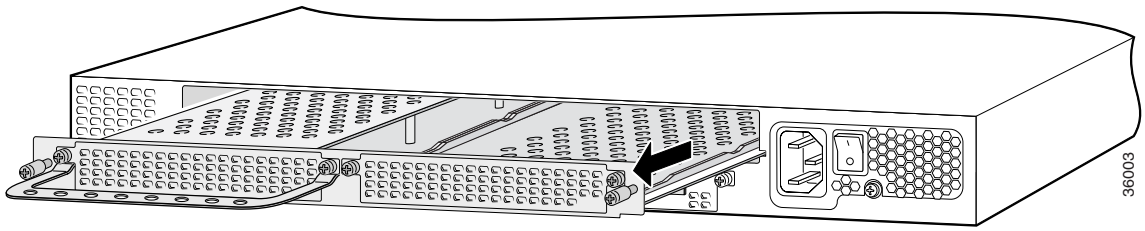
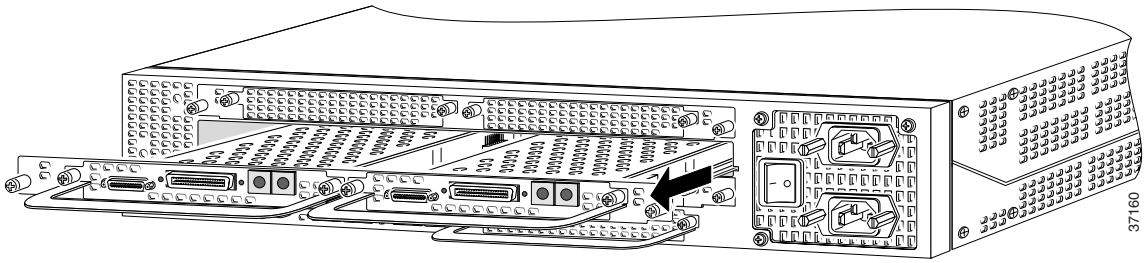


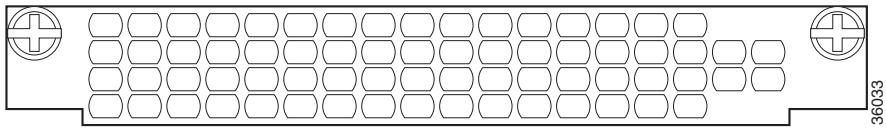
Figure 2-5 Removing the Carrier Card from the Cisco AS5400XM



Step 5 After you remove the carrier card from the chassis, set it aside on an ESD-preventive mat.

Step 6 If the backplane slot is to remain empty, install a blank cover over the open slot to ensure proper airflow inside the chassis. (See Figure 2-6.)

Figure 2-6 Blank Filler Panel



Installing a Populated Carrier Card

To install a populated carrier card:

Step 1 Slide the carrier card into the slot until it touches the backplane connector. (See Figure 2-7 and Figure 2-8.)

Figure 2-7 Installing the Carrier Card in the Cisco AS5350XM

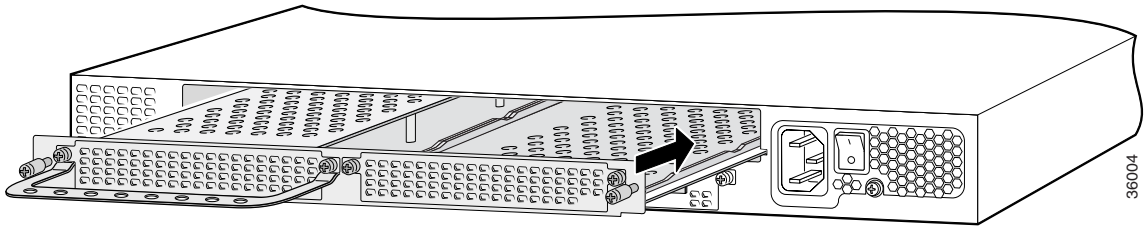
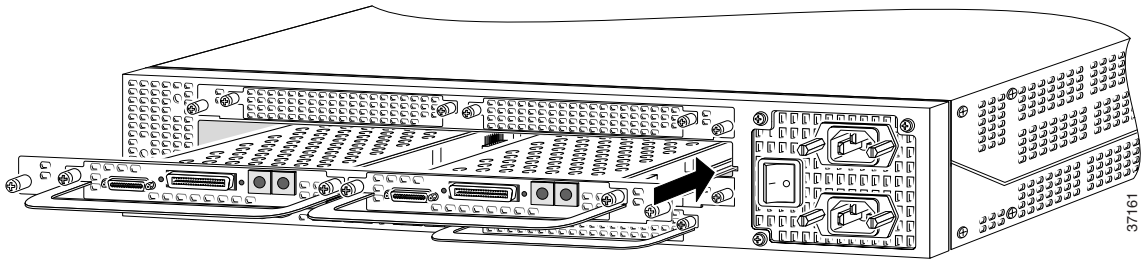


Figure 2-8 Installing the Carrier Card in the Cisco AS5400XM



Step 2 Align the captive screws with their holes, and seat the card completely.

Step 3 Tighten the two captive screws to secure the carrier card to the chassis. (See Figure 2-9 and Figure 2-10.)

Figure 2-9 Tightening the Captive Screws on the Cisco AS5350XM

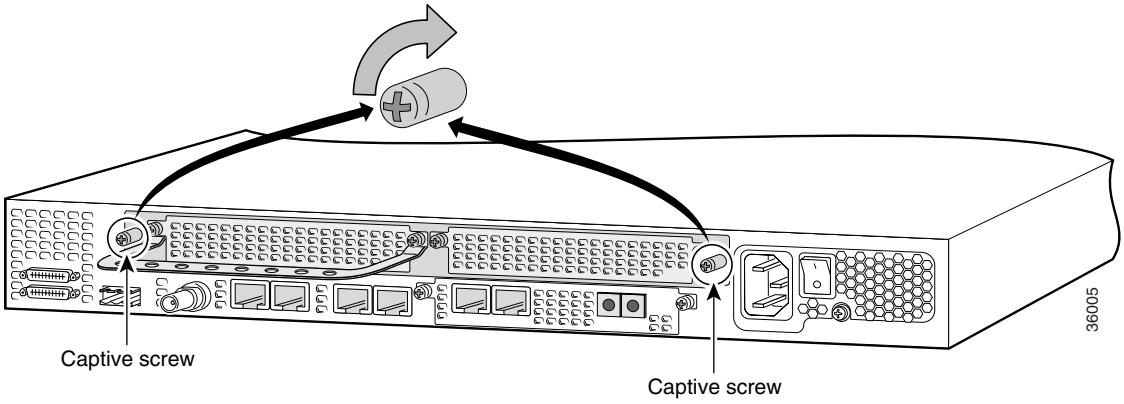
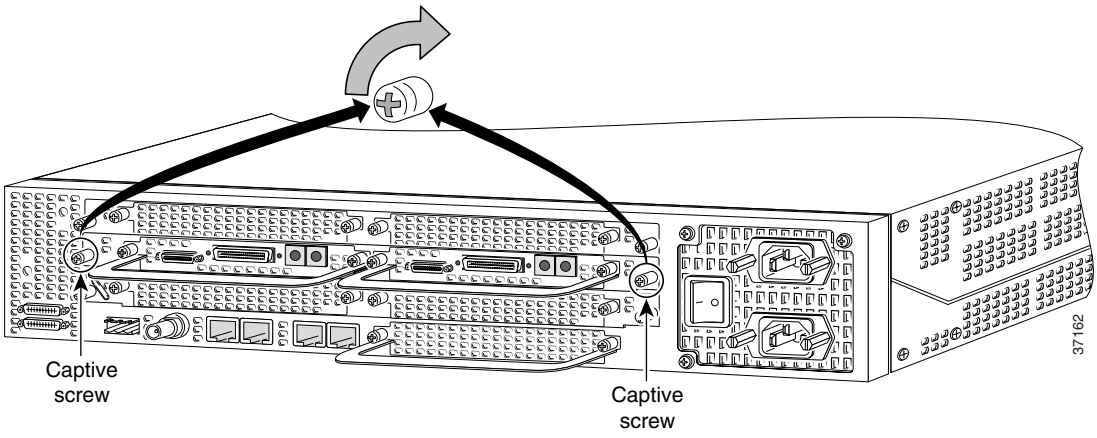
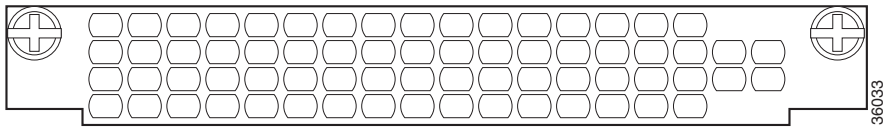


Figure 2-10 Tightening the Captive Screws on the Cisco AS5400XM



Step 4 If the carrier card has a blank feature card slot, install a blank cover over the open feature card slot to ensure proper airflow inside the chassis. (See Figure 2-11.)

Figure 2-11 Blank Feature Card Cover



Step 5 For AC-powered units, reconnect the AC power cord. For DC-powered units, remove the tape from the circuit breaker switch handle, and reinstate power by moving the handle of the circuit breaker to the ON position. For more information about the AC and DC power supplies, see the chassis installation guide for your universal gateway.

Step 6 Reconnect all interface cables.

Getting Help

For information about technical support, onsite service, and exchange and repair services, see the "Obtaining Technical Assistance" section on page xvi.

Where to Go Next

The remaining chapters of this guide include information about installing and troubleshooting feature cards and about building cables.

- Chapter 3, "T1 and E1 Feature Cards"
- Chapter 4, "Channelized T3 Feature Card"
- Chapter 5, "Universal Port and Dial-Only Feature Cards"
- Chapter 6, "Voice Feature Card"
- Chapter 7, "Troubleshooting"
- Appendix A, "Cabling Specifications"

T1 and E1 Feature Cards

This chapter provides procedures for installing and removing the T1 and E1 feature cards and includes the following sections:

- Overview, page 3-1
- Online Installation and Removal of the T1 or E1 Feature Card, page 3-2
- Configuring Input Impedance for the E1 Feature Card, page 3-11
- Getting Help, page 3-12
- Where to Go Next, page 3-12

Overview

You can install a T1 or E1 feature card in any feature card slot of the universal gateway chassis. (See Figure 3-1 through Figure 3-3.)

Figure 3-1 2-Port T1 or E1 Feature Card

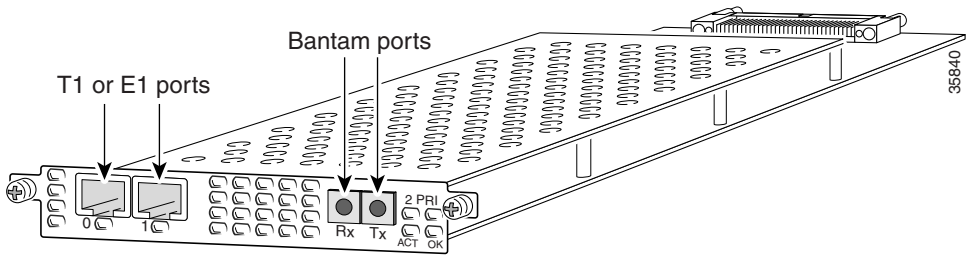


Figure 3-2 4-Port T1 or E1 Feature Card

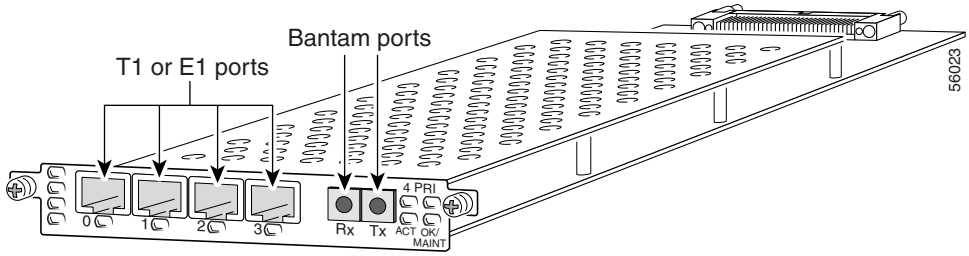
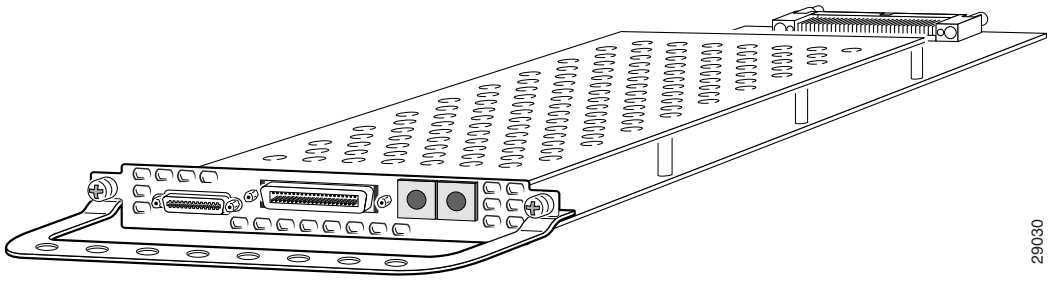


Figure 3-3 8-Port T1 or E1 Feature Card



Note The Cisco AS5350XM and Cisco AS5400XM universal gateways each support only one type of WAN feature card at a time. See Chapter 7, "Troubleshooting," for more information.

Each T1 or E1 feature card provides physical line termination for multiple DS-0 channels and uses onboard HDLC controllers to terminate digital (ISDN) calls. For network specifications, see Table 3-1 and Table 3-2. You can use the bantam jack ports on the feature card to monitor a line.

Table 3-1 T1 Feature Card Network Specifications

Description	Specification
Line rate	1.544 Mbps
Data rate (per port)	*number* x 56 or *number* x 64 kbps, where *number* = 1 to 24
Standards	AT&T Pub. 62411, 54016, and 43081, and ANSI T1.403
Input impedance	100 ohm per port

Table 3-2 E1 Feature Card Network Specifications

Description	Specification
Line rate	2.048 Mbps
Data rate (per port)	*number* x 56 or *number* x 64 kbps, where *number* = 1 to 31.
Input impedance	75 or 120 ohm per port **Note** The factory default setting for the E1 ports is 120 ohm. For information about changing the impedance, see the "Configuring Input Impedance for the E1 Feature Card" section on page 3-11.

Online Installation and Removal of the T1 or E1 Feature Card

To remove a feature card without dropping any calls or connections, you will need to take the feature card out of service by using the **busyout** command to disable the feature card. The **busyout** command is executed on a per–feature card basis and will disable the card after waiting for the active services to terminate.

If there are active calls on the feature card after you execute the **busyout** command, wait for the calls to drop. To view the status of the termination process, use the **show busyout** command.

Caution The online installation and removal (OIR) of new cards should be done *only* during times of low CPU utilization, such as during maintenance.

Caution To avoid erroneous failure messages, remove or insert only one feature card at a time.

When you replace a feature card in a slot with a new feature card of the same type, the system software recognizes the new feature card and brings up the trunk interfaces automatically.

If you replace the existing feature card with a new feature card of a different type, you must reconfigure the system. For configuration details, see the *Cisco AS5350XM and Cisco AS5400XM Universal Gateways Software Configuration Guide*.

Removing the T1 or E1 Feature Card

To remove the T1 or E1 feature card, follow these steps.

Note An example showing the output from each command is provided after the procedure. See the "Online Insertion and Removal Example for the T1 or E1 Feature Card" section on page 3-6.

Step 1 Determine which slot the feature card is in (see Figure 3-4 and Figure 3-5) by entering the **show chassis slot** command in privileged EXEC mode:

```
Router# show chassis slot
```

Note These commands are not valid for slot 0. Slot 0 is the motherboard.

Figure 3-4 Slot Numbering on the Cisco AS5350XM Chassis

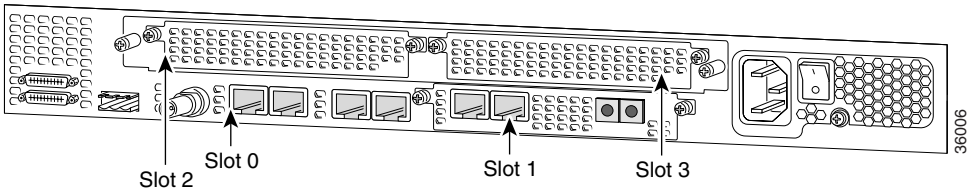
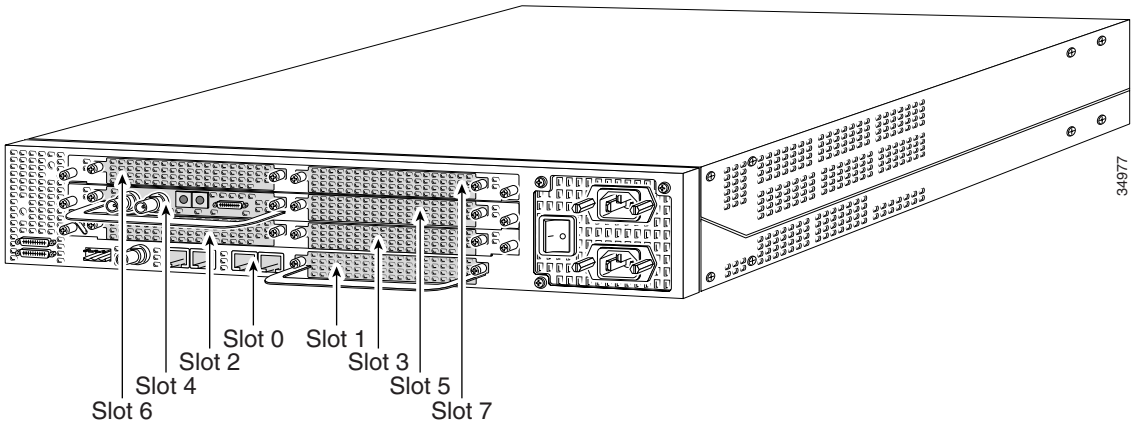


Figure 3-5 Slot Numbering on the Cisco AS5400XM Chassis



Step 2 Initialize the software busyout procedure by entering the **busyout** command:

```
Router# busyout slot-number
```

Step 3 Check busyout status for the slot, by entering the **show busyout** command.

```
Router# show busyout slot-number
```

Step 4 You can use the **clear port** command to immediately disable active calls on a universal port, dial-only, or voice feature card. For more information on the universal port or dial-only feature card, see Chapter 5, "Universal Port and Dial-Only Feature Cards." For more information on the voice feature card, see Chapter 6, "Voice Feature Card." Use the **show controller** command to show the card that is associated with the T1 or E1 feature card.

```
Router# show controller t1/e1 slot-number/control-number timeslot timeslot-number
Router# clear port slot-number/port number
```

Note The **clear port** command applies only to universal port, dial-only, or voice feature cards.

Step 5 Verify that the OK/MAINT LED is off; this indicates that the feature card is offline and ready to be removed.

Note The OK/MAINT LED is green before you enter the **busyout** command. After you enter the **busyout** command, the LED changes to yellow. The LED turns off after all calls are disconnected and resources are taken out of service, indicating that busyout is complete.

Step 6 Attach an ESD-preventive wrist strap.

Warning **Do not work on the system or connect or disconnect cables during periods of lightning activity.** Statement 1001

Step 7 Disconnect all interface cables from the feature card and secure them out of the way.

Step 8 Loosen the two captive screws that secure the feature card to the chassis until each screw is free of the chassis. (See Figure 3-6 and Figure 3-7.)

Figure 3-6 Loosening the Captive Screws on the Cisco AS5350XM Universal Gateway

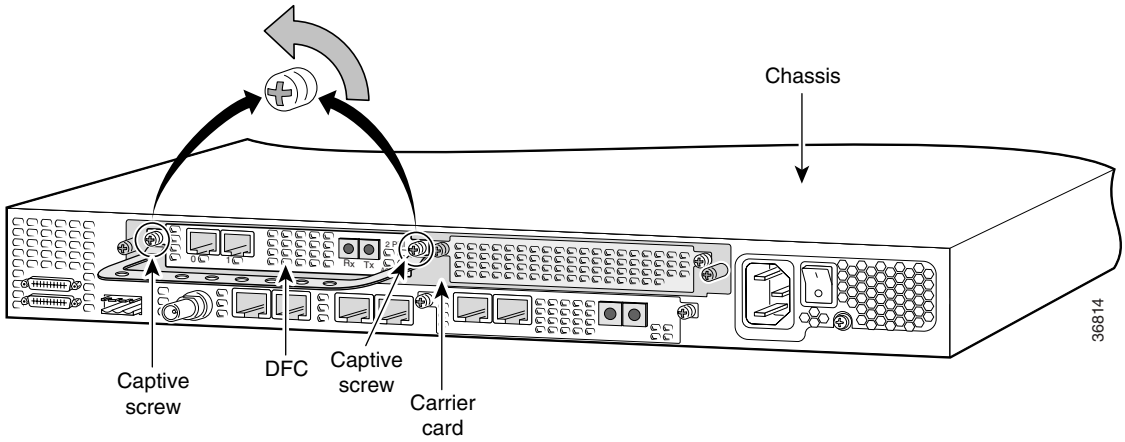
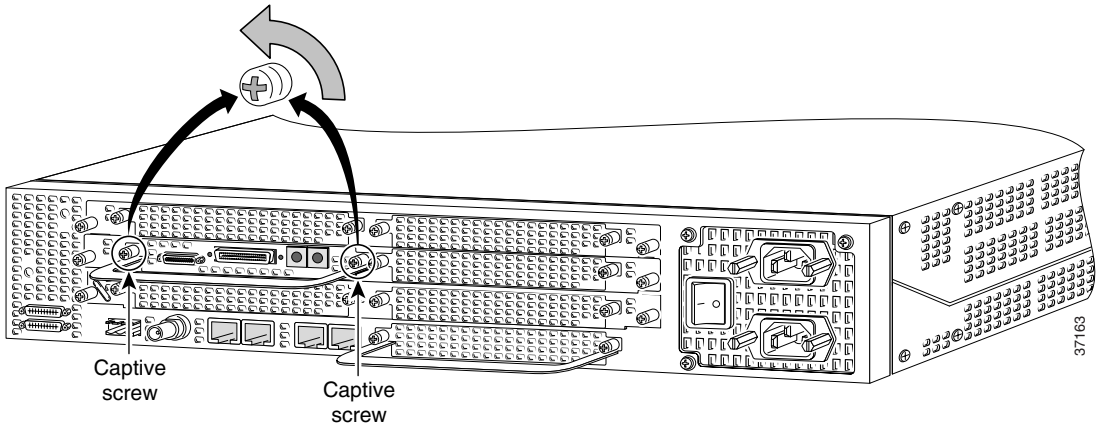


Figure 3-7 Loosening the Captive Screws on the Cisco AS5400XM Universal Gateway



Step 9 Grasp the feature card handle with one hand. Pull the card toward you until the card slides free of the chassis. Grasp the ventilated metal cover with your other hand to support and guide the feature card out of the slot. (See Figure 3-8 and Figure 3-9.)

Caution Avoid touching any pins or circuit board components when you remove or install a feature card.

Figure 3-8 Removing the Feature Card from the Cisco AS5350XM Universal Gateway

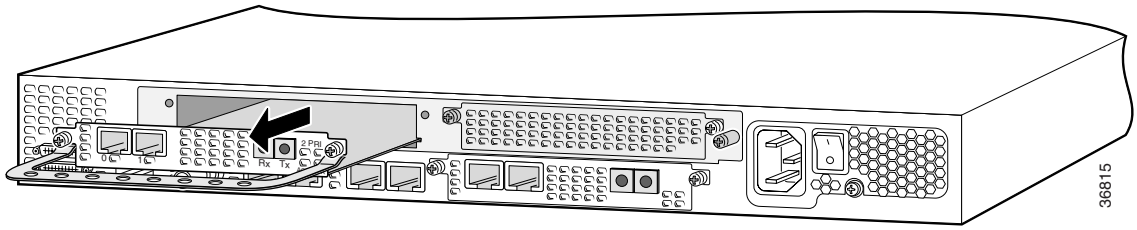
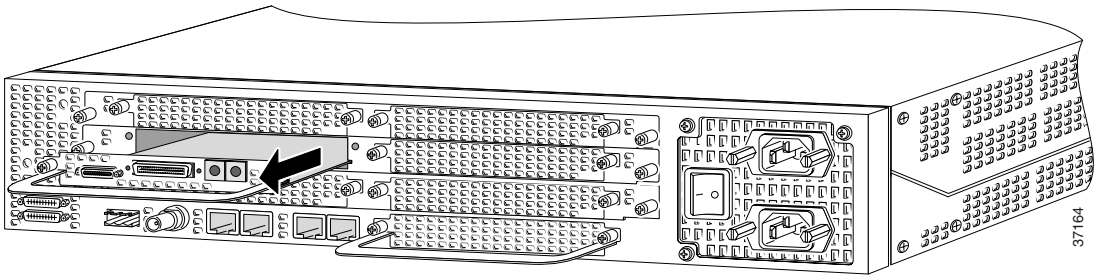


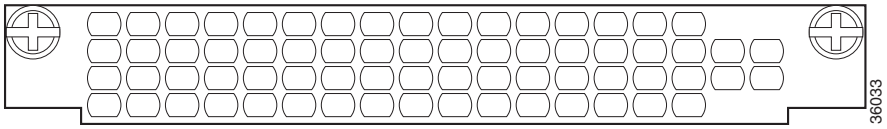
Figure 3-9 Removing the Feature Card from the Cisco AS5400XM Universal Gateway



Step 10 After you remove the feature card from the chassis, set it aside on an ESD-preventive mat.

Step 11 If the feature card slot is to remain empty, install a blank cover over the open feature card slot to ensure proper airflow inside the chassis. (See Figure 3-10.)

Figure 3-10 Blank Feature Card Cover



Online Insertion and Removal Example for the T1 or E1 Feature Card

The following output is an example of the online insertion and removal (OIR) process for an E1 feature card in slot 6 of the universal gateway:

```
Router# show chassis slot 6

Slot 6:
DFC type is E1 8 PRI DFC

OIR events:
        Number of insertions = 0, Number of removals = 0
DFC State is DFC_S_OPERATIONAL

Router#
Router# busyout 6
Busyout in progress for 6
Router# show busyout 6
Busyout status for trunk DFC slot = 6:
DFC slot busyout is in progress
(p - pending, s - static(cfg/exec), d - dynamic, n - none)

6/0   :s s p p p p p p p p p p p p p n p p p p p p p p p p p p p p
6/1   :s s s p p p p p p p p p p p p p n p p p p p p p p p p p p p p
6/2   :s s s p p p p p p p p p p p p p n p p p p p p p p p p p p p p
6/3   :s s s s p p p p p p p p p p p p n p p p p p p p p p p p p p p
6/4   :s s s p p p p p p p p p p p p p n p p p p p p p p p p p p p p
6/5   :s s s p p p p p p p p p p p p p n p p p p p p p p p p p p p p
6/6   :s s s p p p p p p p p p p p p p n p p p p p p p p p p p p p p
6/7   :s s p p p p p p p p p p p p p p n p p p p p p p p p p p p p p

Router#
Router# show controller e1 6/0 timeslot 1-31
```

```
E1 6/0 is up:
DS0  Type             Modem    Status  rxA rxB rxC rxD  txA txB txC txD
 1   pri               -       idle
 2   pri               -       idle
 3   pri-modem        1/70     active
 4   pri-modem        1/46     active
 5   pri-modem        1/22     active
 6   pri-modem        4/61     active
 7   pri-modem        4/53     active
 8   pri-modem        4/45     active
 9   pri-modem        4/37     active
10   pri-modem        4/29     active
11   pri-modem        4/21     active
12   pri-modem        4/13     active
13   pri-modem        4/05     active
14   pri-modem       2/105     active
15   pri-modem        2/97     active
16   pri-D channel     -         -
17   pri-modem        2/89     active
18   pri-modem        2/81     active
19   pri-modem        2/73     active
20   pri-modem        2/65     active
21   pri-modem        2/57     active
22   pri-modem        2/49     active
23   pri-modem        2/41     active
24   pri-modem        2/33     active
25   pri-modem        2/25     active
26   pri-modem        2/17     active
27   pri-modem        2/09     active
28   pri-modem        2/01     active
29   pri-modem       1/107     active
30   pri-modem        1/99     active
31   pri-modem        1/91     active
Router#
Router# show busyout 6
Busyout status for trunk DFC slot = 6:
DFC slot busyout is in progress
(p - pending, s - static(cfg/exec), d - dynamic, n - none)

6/0   :s s p p p p p p p p p p p p n p p p p p p p p p p p p p p
6/1   :s s s p p p p p p p p p p p n p p p p p p p p p p p p p p
6/2   :s s s p p p p p p p p p p p n p p p p p p p p p p p p p p
6/3   :s s s s p p p p p p p p p p n p p p p p p p p p p p p p p
6/4   :s s s p p p p p p p p p p p n p p p p p p p p p p p p p p
6/5   :s s s p p p p p p p p p p p n p p p p p p p p p p p p p p
6/6   :s s s p p p p p p p p p p p n p p p p p p p p p p p p p p
6/7   :s s p p p p p p p p p p p p n p p p p p p p p p p p p p p


Router# clear port 1/70
This will clear port 1/70[confirm]
*Jan  1 00:27:37.083:%PORT-6-SM_PORT_CLEARED:Port 1/70 Cleared

Router# show busyout 6
Busyout status for trunk DFC slot = 6:
DFC slot busyout is in progress
(p - pending, s - static(cfg/exec), d - dynamic, n - none)

6/0   :s s s s s s s s s s p p p p p n p p p p p p p p p p p p p p
6/1   :s s s p p p p p p p p p p p n p p p p p p p p p p p p p p
6/2   :s s s p p p p p p p p p p p n p p p p p p p p p p p p p p
6/3   :s s s s p p p p p p p p p p n p p p p p p p p p p p p p p
6/4   :s s s p p p p p p p p p p p n p p p p p p p p p p p p p p
```

```
6/5   :s s s p p p p p p p p p p p p n p p p p p p p p p p p p p p
6/6   :s s s p p p p p p p p p p p p n p p p p p p p p p p p p p p
6/7   :s s p p p p p p p p p p p p p n p p p p p p p p p p p p p p

Router#
Router#
*Jan  1 00:32:40.271:%PORT-6-SM_PORT_CLEARED:All Ports Are Cleared
*Jan  1 00:32:40.635:%OIR-6-REMCARD:Card removed from slot 6, interfaces disabled
*Jan  1 00:32:40.643:%TRUNK_CLOCK-6-SWITCH:Switching to the clock on slot 7 port 0
priority 214 as the current primary has gone bad
*Jan  1 00:32:40.647:%CSM-5-PRI:delete PRI at slot 6, unit 0, channel 15 with index 0
*Jan  1 00:32:40.655:%CSM-5-PRI:delete PRI at slot 6, unit 1, channel 15 with index 1
*Jan  1 00:32:40.663:%CSM-5-PRI:delete PRI at slot 6, unit 2, channel 15 with index 2
*Jan  1 00:32:40.667:%CSM-5-PRI:delete PRI at slot 6, unit 3, channel 15 with index 3
*Jan  1 00:32:40.675:%CSM-5-PRI:delete PRI at slot 6, unit 4, channel 15 with index 4
*Jan  1 00:32:40.683:%CSM-5-PRI:delete PRI at slot 6, unit 5, channel 15 with index 4
*Jan  1 00:32:40.687:%CSM-5-PRI:delete PRI at slot 6, unit 6, channel 15 with index 3
*Jan  1 00:32:40.695:%CSM-5-PRI:delete PRI at slot 6, unit 7, channel 15 with index 2
Router#
*Jan  1 00:32:48.515:%ISDN-6-LAYER2DOWN:Layer 2 for Interface Se6/4:15, TEI 0 changed to
down
*Jan  1 00:32:48.523:%ISDN-6-LAYER2DOWN:Layer 2 for Interface Se6/5:15, TEI 0 changed to
down
*Jan  1 00:32:48.523:%ISDN-6-LAYER2DOWN:Layer 2 for Interface Se6/0:15, TEI 0 changed to
down
*Jan  1 00:32:48.523:%ISDN-6-LAYER2DOWN:Layer 2 for Interface Se6/3:15, TEI 0 changed to
down
*Jan  1 00:32:48.523:%ISDN-6-LAYER2DOWN:Layer 2 for Interface Se6/6:15, TEI 0 changed to
down
*Jan  1 00:32:48.527:%ISDN-6-LAYER2DOWN:Layer 2 for Interface Se6/7:15, TEI 0 changed to
down
*Jan  1 00:32:48.527:%ISDN-6-LAYER2DOWN:Layer 2 for Interface Se6/1:15, TEI 0 changed to
down
Router#
Router# show chassis slot 6

Slot 6:
DFC type is Empty DFC
DFC is not powered

OIR events:
        Number of insertions = 0, Number of removals = 1

Router#
Router# show chassis slot 6

Slot 6:
DFC type is E1 8 PRI DFC

OIR events:
        Number of insertions = 1, Number of removals = 1
DFC State is DFC_S_OPERATIONAL
```

Installing the T1 or E1 Feature Card

Warning **Do not work on the system or connect or disconnect cables during periods of lightning activity.** Statement 1001

Warning **The E1 interface card may only be installed in an ACA-permitted customer equipment or a Data Terminal Equipment (DTE) that is exempted from ACA's permit requirements. The customer equipment must only be housed in a cabinet that has screw-down lids to stop user access to overvoltages on the customer equipment. The customer equipment has circuitry that may have telecommunications network voltages on them.** Statement 90

Warning **The telecommunications lines must be disconnected 1) before unplugging the main power connector and/or 2) while the housing is open.** Statement 89

Note When you replace a feature card in a slot with a new feature card of the same type, the system software recognizes the new feature card and brings up the trunk interfaces automatically. If you replace the existing feature card with a new feature card of a different type, you must reconfigure the system. For configuration details, see the *Cisco AS5350XM and Cisco AS5400XM Universal Gateways Software Configuration Guide*.

To install the T1 or E1 feature card, follow these steps:

Step 1 Attach an ESD-preventive wrist strap.

Step 2 Slide the feature card into the slot until the connector pins make contact with the carrier card backplane connector. (See Figure 3-11 and Figure 3-12.)

Figure 3-11 Installing the T1 or E1 Feature Card in the Cisco AS5350XM Universal Gateway

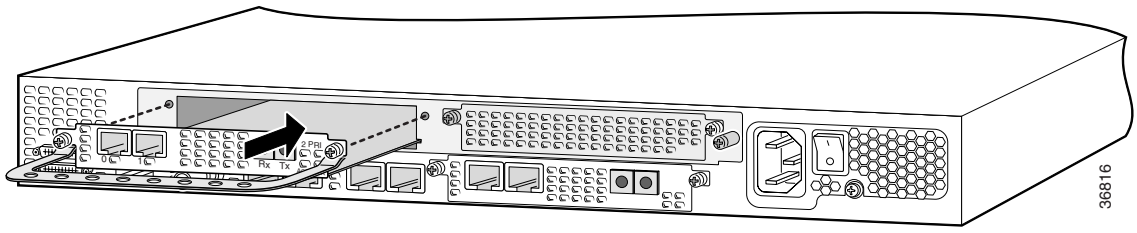
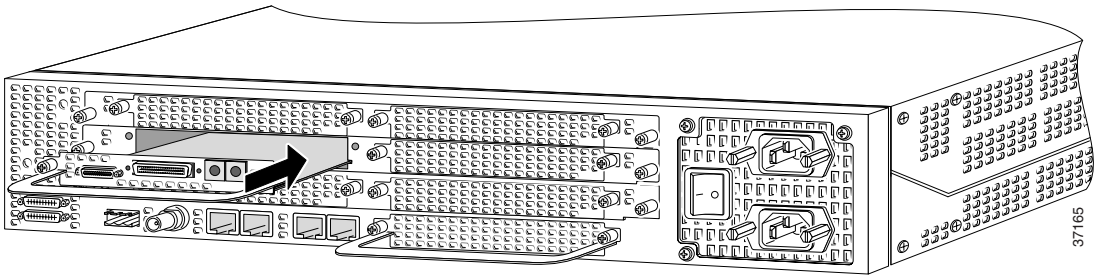


Figure 3-12 Installing the T1 or E1 Feature Card in the Cisco AS5400XM Universal Gateway



Step 3 Align the captive screws with their holes, and seat the card completely.

Step 4 Tighten the screws to secure the feature card to the chassis. (See Figure 3-13 and Figure 3-14.)

Figure 3-13 Tightening the Captive Screws on the Cisco AS5350XM Universal Gateway

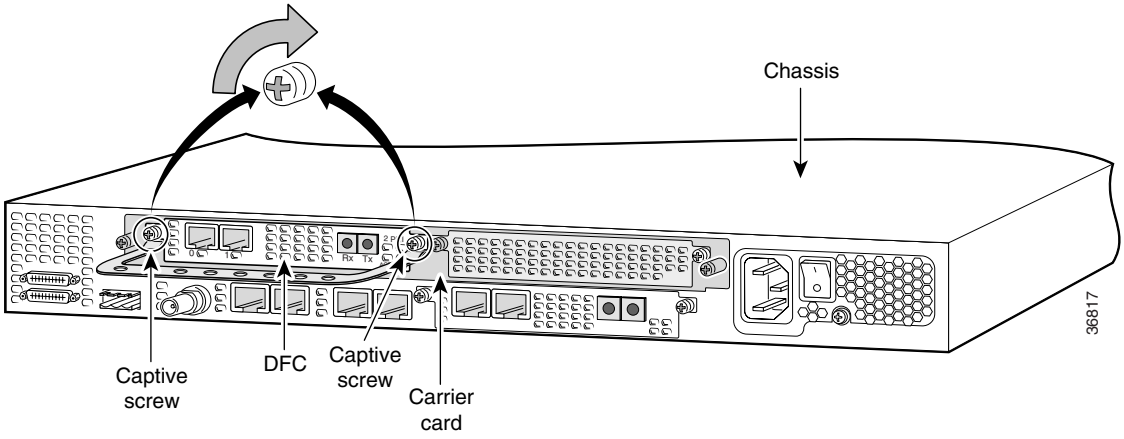
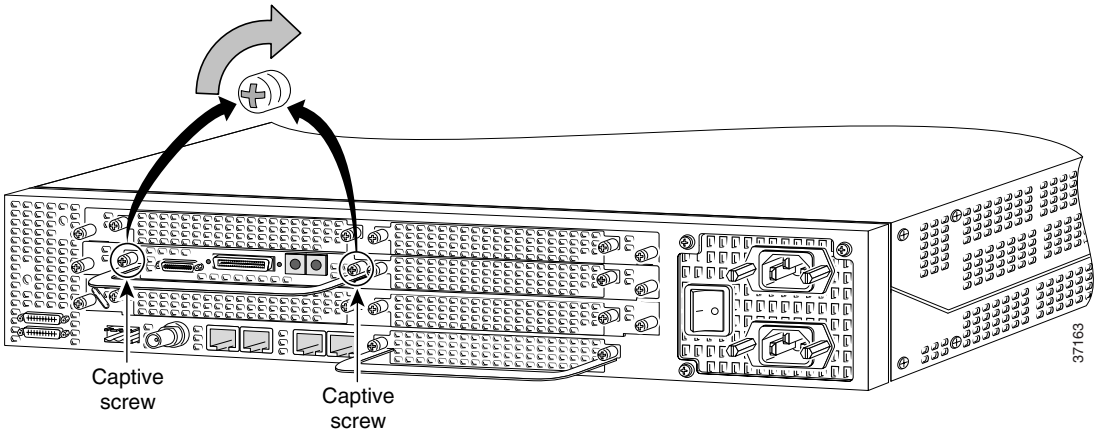


Figure 3-14 Tightening the Captive Screws on the Cisco AS5400XM Universal Gateway



Step 5 Check the card LEDs to verify that the card is working properly. For information about feature card LEDs, see Chapter 7, "Troubleshooting."

Note For information about configuring the T1 or E1 ports, see the *Cisco AS5350XM and Cisco AS5400XM Universal Gateways Software Configuration Guide*.

Configuring Input Impedance for the E1 Feature Card

You can set the input impedance of the E1 feature card before or after running the setup script. For information on configuring the universal gateway with the setup script, see the *Cisco AS5350XM and Cisco AS5400XM Universal Gateways Software Configuration Guide*.

Configuration

To set the input impedance for the E1 feature card, use the **line-termination** command.

	Command	Purpose

Step 1	`Router> enable`
	`Password: password`
	`Router#`
		Enters enable mode.
		Enter the password. You have entered enable mode when the prompt changes to `Router#`.

Step 2	`Router# configure terminal`
	`Enter configuration commands, one per line. End with CNTL/Z.`
	`Router(config)#`
		Enters global configuration mode. You have entered global configuration mode when the prompt changes to `Router(config)#`.

Step 3	`Router(config)# controller e1 0` `Router(config-controller)#`	Enter the controller number on which you are configuring input impedance.
Step 4	`Router(config-controller)# line-termination 75-ohm`	Sets the input impedance to 75 ohm for the controller. The factory-set default is 120 ohm. Repeat Step 3 and Step 4 for the other controllers.

Step 5	`Router(config-controller)# Ctrl-Z`
	`Router#`
	`%SYS-5-CONFIG_I: Configured from console by console`
		Returns to enable mode.
		This message is normal and does not indicate an error.

Verification

To verify the impedance, enter the **show running-config** command.

Note By default, input impedance is 120 ohm. In the following example, the input impedance was successfully changed to 75 ohm using the **line-termination 75-ohm** command. Some of the configuration has been deleted for readability.

```
Router# show running-config
Building configuration...

Current configuration:
.
.
.
!
controller E1 0
clock source free-running
line-termination 75-ohm
pri-group timeslots 1-31
!
.
.
.
Router#
```

Getting Help

For information about technical support, onsite service, and exchange and repair services, see the "Obtaining Technical Assistance" section on page xvi.

Where to Go Next

The remaining chapters of this guide include information about installing and troubleshooting feature cards and about building cables.

- Chapter 4, "Channelized T3 Feature Card"
- Chapter 5, "Universal Port and Dial-Only Feature Cards"
- Chapter 6, "Voice Feature Card"
- Chapter 7, "Troubleshooting"
- Appendix A, "Cabling Specifications"

Channelized T3 Feature Card

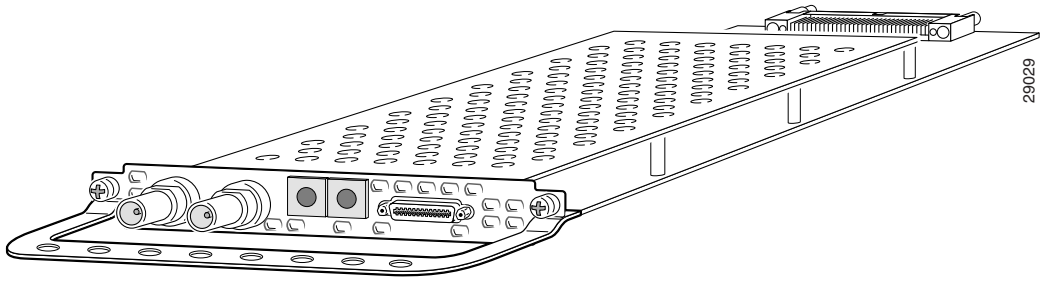
This chapter describes the channelized T3 (CT3) feature card and includes the following sections:

- Overview, page 4-1
- Online Insertion and Removal of the CT3 Feature Card, page 4-2
- Getting Help, page 4-7
- Where to Go Next, page 4-7

Overview

The CT3 feature card provides physical line termination for a channelized T3 ingress trunk line. It uses an onboard multiplexer to multiplex 28 channelized T1 lines into a single channelized T3 line. (See Figure 4-1.)

Figure 4-1 CT3 Feature Card



Note The Cisco AS5350XM and Cisco AS5400XM universal gateways each support only one type of WAN feature card at a time. See Chapter 7, "Troubleshooting," for more information.

The CT3 feature card provides physical line termination for up to 672 DS0 channels and uses onboard High-Level Data Link Control (HDLC) controllers to terminate digital (ISDN) calls.

You can use the bantam jack ports on the feature card to monitor a T1 line or to test any of the individual T1 channels in drop and insert mode.

You can install a CT3 feature card in any feature card slot in a universal gateway chassis.

Online Insertion and Removal of the CT3 Feature Card

To remove a feature card without dropping any calls or connections, you will need to take the feature card out of service by using the **busyout** command to disable the feature card. The **busyout** command is executed on a per–feature card basis and will disable the card after waiting for the active services to terminate.

If there are active calls on the feature card after you execute the **busyout** command, wait for the calls to drop. To view the status of the termination process, use the **show busyout** command.

Caution The online installation and removal (OIR) of new cards should be done *only* during times of low CPU utilization, such as during maintenance.

Caution To avoid erroneous failure messages, remove or insert only one feature card at a time.

When you replace a feature card in a slot with a new feature card of the same type, the system software recognizes the new feature card and brings up the trunk interfaces automatically.

If you replace the existing feature card with a new feature card of a different type, you must reconfigure the system. For configuration details, see the *Cisco AS5350XM and Cisco AS5400XM Universal Gateways Software Configuration Guide*.

Removing the CT3 Feature Card

To remove the CT3 feature card, follow these steps.

Note The OIR procedure for the CT3 feature card is similar to that for the T1 or E1 feature card. See the "Online Insertion and Removal Example for the T1 or E1 Feature Card" section on page 3-6 for an example of the output during OIR of an E1 feature card.

Step 1 Determine which slot the feature card is in (see Figure 4-2 and Figure 4-3) by entering the **show chassis slot** command in privileged EXEC mode:

```
Router# show chassis slot
```

Note These commands are not valid for slot 0. Slot 0 is the motherboard.

Figure 4-2 Slot Numbering on the Cisco AS5350XM Chassis

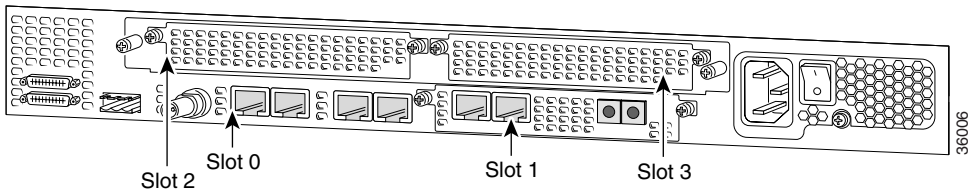
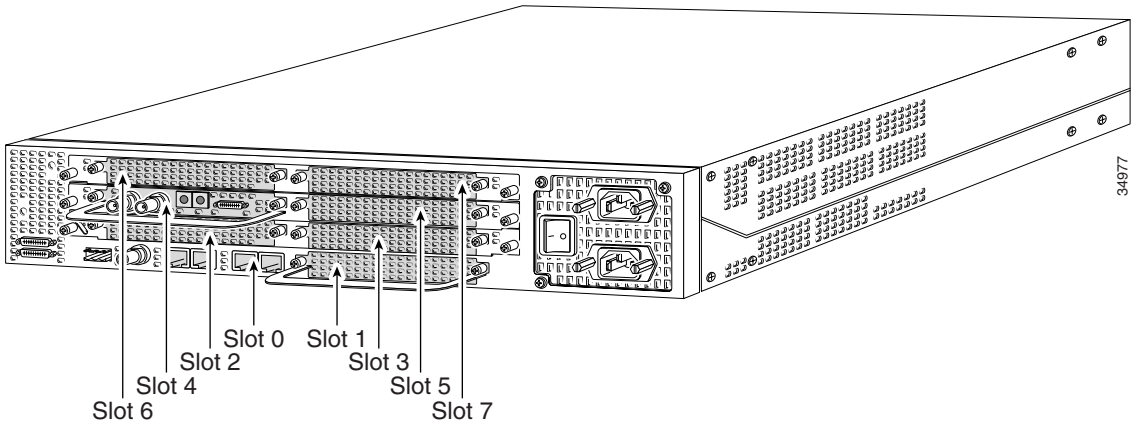


Figure 4-3 Slot Numbering on the Cisco AS5400XM Chassis



Step 2 Initialize the software busyout procedure by entering the **busyout** command:

```
Router# busyout slot-number
```

Step 3 Check busyout status for the slot, by entering the **show busyout** command.

```
Router# show busyout slot-number
```

Step 4 You can use the **clear port** command to immediately disable active calls on the universal port, dial-only, or voice feature card. For more information on the universal port or dial-only feature card, see Chapter 5, "Universal Port and Dial-Only Feature Cards." For more information on the voice feature card, see Chapter 6, "Voice Feature Card." Use the **show controller** command to show the feature card that is associated with the CT3 feature card.

```
Router# show controller t3 slot-number/control-number timeslot timeslot-number
Router# clear port slot-number/port number
```

Note The **clear port** command applies only to universal port, dial-only, or voice feature cards.

Step 5 Verify that the OK/MAINT LED is off; this indicates that the feature card is offline and ready to be removed.

Note The OK/MAINT LED is green before you enter the **busyout** command. After you enter the **busyout** command, the LED changes to yellow. The LED turns off after all calls are disconnected and resources are taken out of service, indicating that busyout is complete.

Step 6 Attach an ESD-preventive wrist strap.

Warning **Do not work on the system or connect or disconnect cables during periods of lightning activity.** Statement 1001

Step 7 Disconnect all interface cables from the feature card and secure them out of the way.

Note The OIR procedure for the CT3 feature card is similar to that for the T1 or E1 feature card. See the "Online Insertion and Removal Example for the T1 or E1 Feature Card" section on page 3-6 for an example of the output during OIR of an E1 feature card.

Step 8 Loosen the two captive screws that secure the feature card to the chassis until each screw is free of the chassis. (See Figure 4-4 and Figure 4-5.)

Figure 4-4 Loosening the Captive Screws on the Cisco AS5350XM Universal Gateway

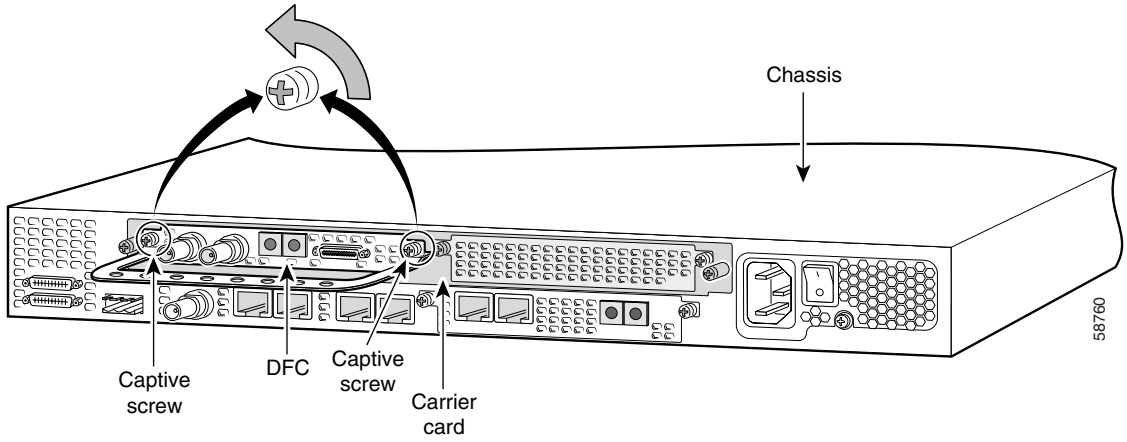
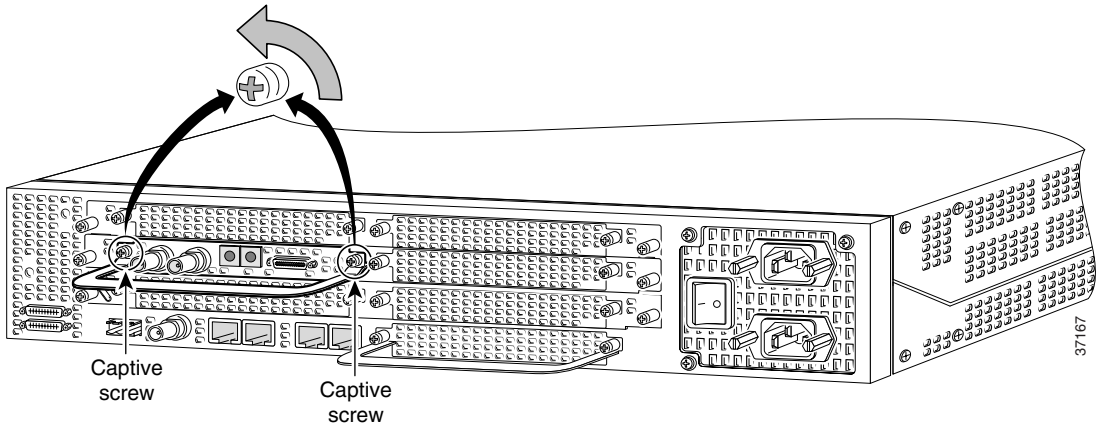


Figure 4-5 Loosening the Captive Screws on the Cisco AS5400XM Universal Gateway



Step 9 Grasp the feature card handle with one hand. Pull the card toward you until the card slides free of the chassis. Grasp the ventilated metal cover with your other hand to support and guide the feature card out of the slot. (See Figure 4-6 and Figure 4-7.)

Caution Avoid touching any pins or circuit board components when you remove or install a feature card.

Figure 4-6 Removing the Feature Card from the Cisco AS5350XM Universal Gateway

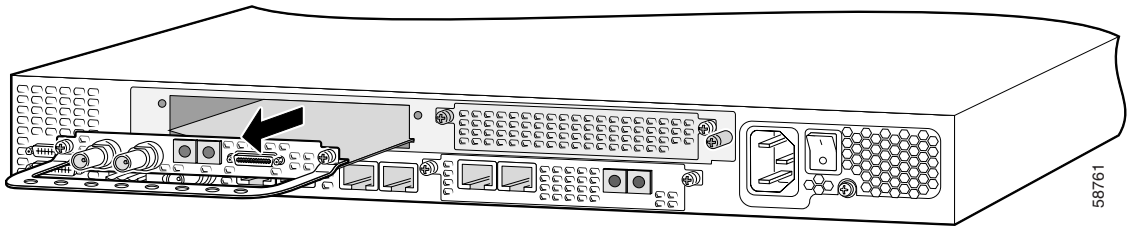
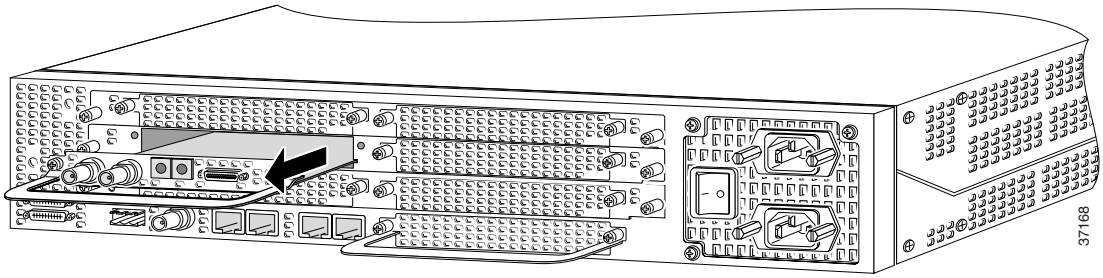


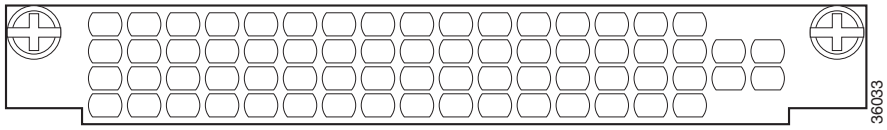
Figure 4-7 Removing the Feature Card from the Cisco AS5400XM Universal Gateway



Step 10 After you remove the feature card from the chassis, set it aside on an ESD-preventive mat.

Step 11 If a feature card slot on the carrier card is to remain empty, install a blank cover over the open feature card slot to ensure proper airflow inside the chassis. (See Figure 4-8.)

Figure 4-8 Blank Feature Card Cover



Installing the CT3 Feature Card

Warning **Do not work on the system or connect or disconnect cables during periods of lightning activity.** Statement 1001

Note When you replace a feature card with a new feature card of the same type in the same slot, the system software recognizes the new feature card and brings up the trunk interfaces automatically. If you replace the existing feature card with a new feature card of a different type, you must reconfigure the system. For configuration details, see the *Cisco AS5350XM and Cisco AS5400XM Universal Gateways Software Configuration Guide*.

To install the CT3 feature card, follow these steps:

Step 1 Attach an ESD-preventive wrist strap.

Step 2 Slide the feature card into the slot until the connector pins make contact with the carrier card backplane connector. (See Figure 4-9 and Figure 4-10.)

Figure 4-9 Installing the CT3 Feature Card in the Cisco AS5350XM Universal Gateway

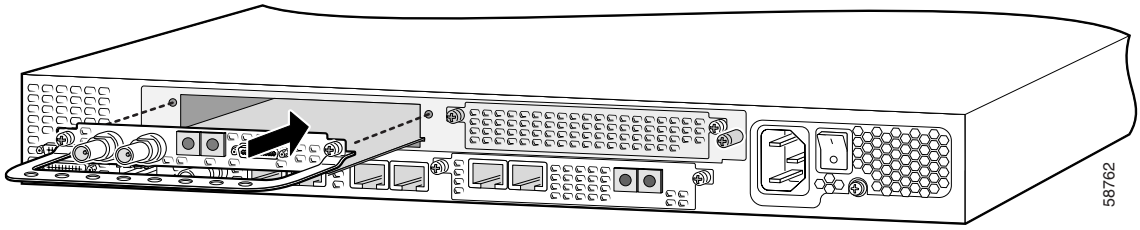
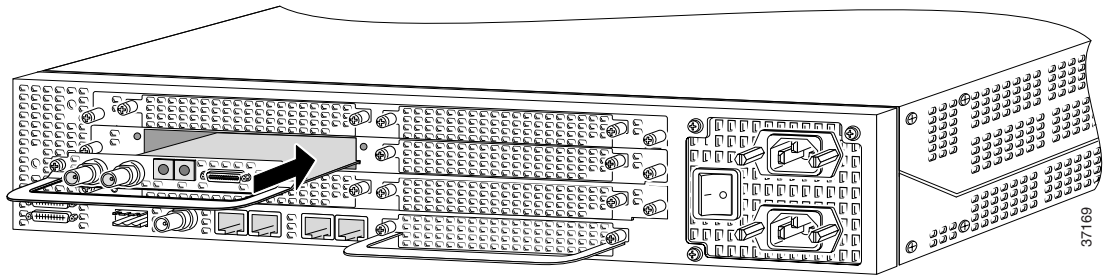


Figure 4-10 Installing the CT3 Feature Card in the Cisco AS5400XM Universal Gateway



Step 3 Align the captive screws with their holes, and seat the card completely.

Step 4 Tighten the screws to secure the feature card to the chassis. (See Figure 4-11 and Figure 4-12.)

Figure 4-11 Tightening the Captive Screws on the Cisco AS5350XM Universal Gateway

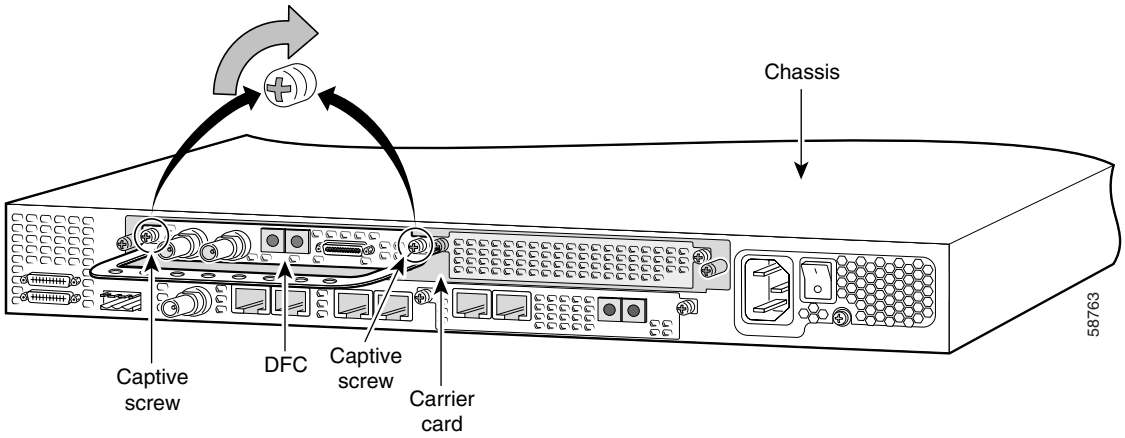
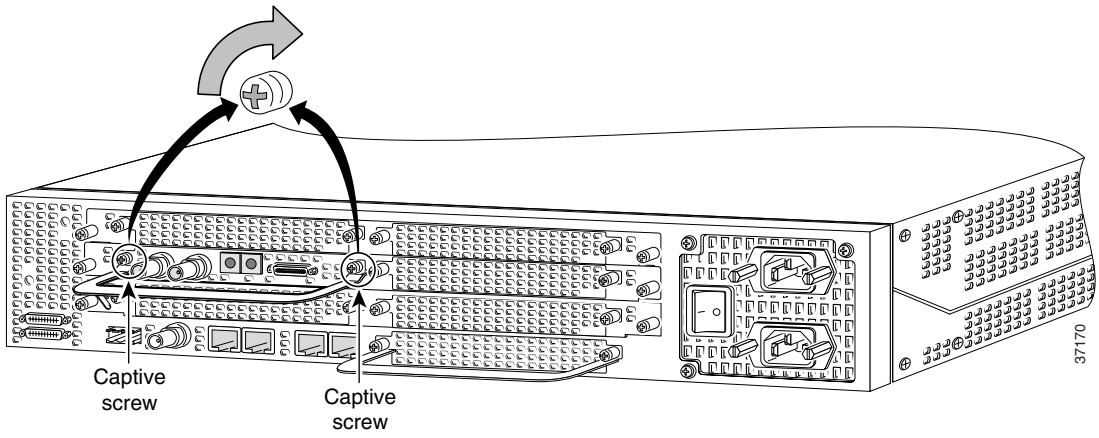


Figure 4-12 Tightening the Captive Screws on the Cisco AS5400XM Universal Gateway



Step 5 Check the card LEDs to verify that the card is working properly. For information about feature card LEDs, see Chapter 7, "Troubleshooting."

Getting Help

For information about technical support, onsite service, and exchange and repair services, see the "Obtaining Technical Assistance" section on page xvi.

Where to Go Next

The remaining chapters of this guide include information about installing and troubleshooting feature cards and about building cables.

- Chapter 5, "Universal Port and Dial-Only Feature Cards"
- Chapter 6, "Voice Feature Card"
- Chapter 7, "Troubleshooting"
- Appendix A, "Cabling Specifications"

Universal Port and Dial-Only Feature Cards

This chapter describes universal port and dial-only feature cards and includes the following sections:

- Overview, page 5-1
- Online Insertion and Removal of the Universal Port or Dial-Only Feature Card, page 5-3
- System Processing Engine Firmware, page 5-10
- Getting Help, page 5-10
- Where to Go Next, page 5-10

Overview

Two different types of Nextport digital signal processor (DSP) feature cards are available for Cisco AS5350XM and Cisco AS5400XM universal gateways. (See Figure 5-1.)

- Universal port feature card—The universal port feature card supports 60 (NP-60) to 108 (NP-108) voice, fax, and dial calls in Cisco AS5350XM and Cisco AS5400XM universal gateways.
- Dial-only feature card—The dial-only feature card supports 60 (DL-60) to 108 (DL-108) dial calls in Cisco AS5350XM and Cisco AS5400XM universal gateways. It does not support voice or fax services.

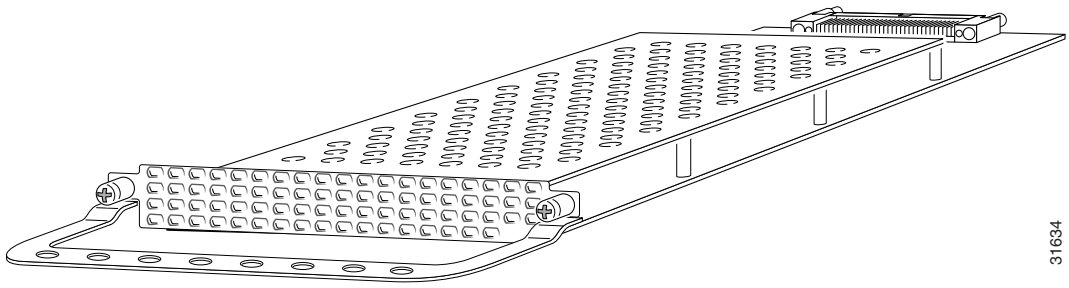
Note Dial services include modem calls (all modulations), ISDN digital calls, V.110 data calls, and V.120 data calls. Modem pass-through calls are not included in dial services.

For configuration details, see the *Cisco AS5350XM and Cisco AS5400XM Universal Gateways Software Configuration Guide*. For information on voice and fax commands, see the Cisco IOS Voice Configuration Library for your Cisco IOS software release at Cisco.com.

You can install a universal port or dial-only feature card in any card slot in the universal gateway chassis. The universal port and dial-only feature cards do not require external connections.

Note The dial-only feature card is configured in the same way as the universal port feature card. This allows the dial-only feature card to be used with your existing software configuration.

Figure 5-1 Universal Port or Dial-Only Feature Card



Note The versions of the universal port and dial-only feature cards are identified on the card faceplate. The universal port feature card faceplates are labeled NP-60 or NP-108, depending on the number of calls supported. The dial-only feature card faceplates are labeled DL-60 or DL-108, depending on the number of calls supported.

Restrictions for the Universal Port and Dial-Only Feature Cards

If a dial-only feature card is installed in a chassis with the universal port feature card, only the dial services are supported. Table 5-1 describes the behavior of the Cisco AS5350XM and Cisco AS5400XM universal gateways with dial-only feature cards, universal port feature cards, or both types of cards installed in the chassis.

Caution We do not recommend deploying dial-only feature cards in a chassis that supports voice and fax services, because voice or fax calls assigned to the dial-only feature card will fail.

Note For information about mixing voice feature cards with the universal port and dial-only feature cards, see the "Restrictions for the Voice Feature Card" section on page 6-2.

Table 5-1 Features Supported on Universal Port and Dial-Only Feature Cards

Feature Cards Installed	Services Supported
Only dial-only feature cards installed	Dial services
Only universal port feature cards installed	Dial, voice, and fax services
Both universal port and dial-only feature cards installed	Dial services

Online Insertion and Removal of the Universal Port or Dial-Only Feature Card

To remove a feature card without dropping any calls or connections, you will need to take the feature card out of service by using the **busyout** command to disable the feature card. The **busyout** command is executed on a per–feature card basis and will disable the card after waiting for the active services to terminate.

If there are active calls on the feature card after you execute the **busyout** command, wait for the calls to drop. To view the status of the termination process, use the **show busyout** command.

Caution The online installation and removal (OIR) of new cards should be done *only* during times of low CPU utilization, such as during maintenance.

Caution To avoid erroneous failure messages, remove or insert only one feature card at a time.

When you replace a feature card in a slot with a new feature card of the same type, the system software recognizes the new feature card and brings up the trunk interfaces automatically.

If you replace the existing feature card with a new feature card of a different type, you must reconfigure the system. For configuration details, see the *Cisco AS5350XM and Cisco AS5400XM Universal Gateways Software Configuration Guide*. For information on voice and fax commands, see the *Monitoring Voice and Fax Services on the Cisco AS5350 and Cisco AS5400 Universal Gateways* online document.

Removing the Universal Port or Dial-Only Feature Card

To remove the universal port or dial-only feature card, follow these steps.

Note An example showing the output from each command is provided after the procedure. See the "Online Insertion and Removal Example for the Universal Port or Dial-Only Feature Card" section on page 5-6.

Step 1 Determine which slot the feature card is in (see Figure 5-2 and Figure 5-3) by entering the **show chassis slot** command in privileged EXEC mode:

```
Router# show chassis slot
```

Note These commands are not valid for slot 0. Slot 0 is the motherboard.

Figure 5-2 Slot Numbering on the Cisco AS5350XM Chassis

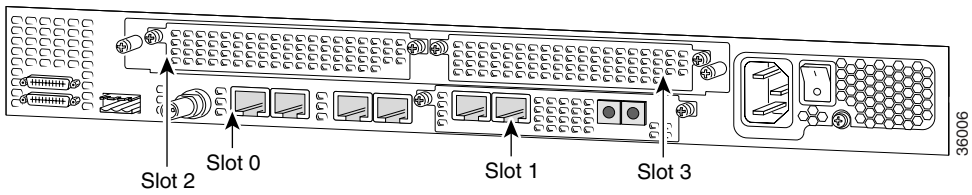
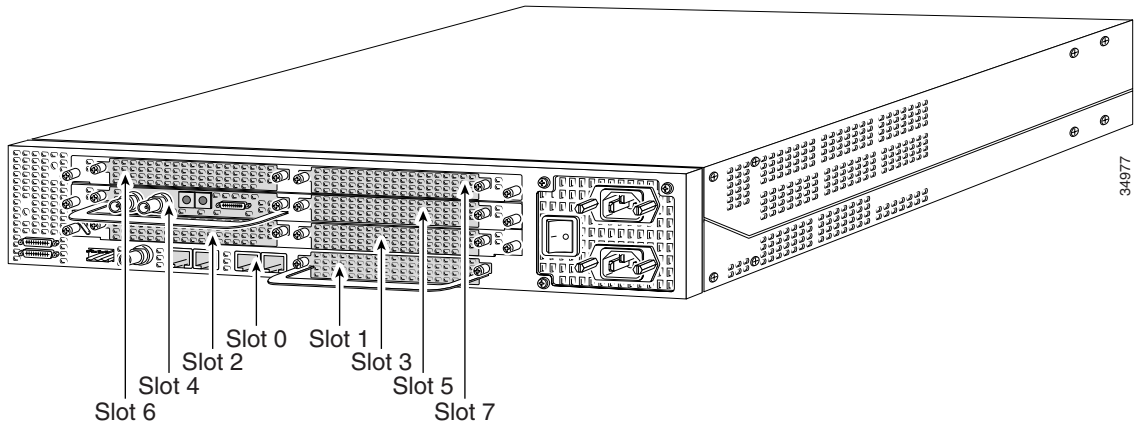


Figure 5-3 Slot Numbering on the Cisco AS5400XM Chassis



Step 2 Initialize the software busyout procedure by entering the **busyout** command:

```
Router# busyout slot-number
```

Step 3 To check busyout status for the slot, enter the **show busyout** command:

```
Router# show busyout slot-number
```

Step 4 You can use the **clear port** command to immediately disable active calls on a universal port or dial-only feature card.

```
Router# clear port slot-number/port number
```

Step 5 Verify that the OK/MAINT LED is off; this indicates that the feature card is offline and ready to be removed.

Note The OK/MAINT LED is green before you enter the busyout command. After you enter the **busyout** command, the LED changes to yellow. The LED turns off after all calls are disconnected and resources taken out of service, indicating that **busyout** is complete.

Step 6 Attach an ESD-preventive wrist strap.

Warning **Do not work on the system or connect or disconnect cables during periods of lightning activity.** Statement 1001

Step 7 Loosen the two captive screws that secure the feature card to the chassis until each screw is free of the chassis. (See Figure 5-4 and Figure 5-5.)

Figure 5-4 Loosening the Captive Screws on the Cisco AS5350XM Universal Gateway

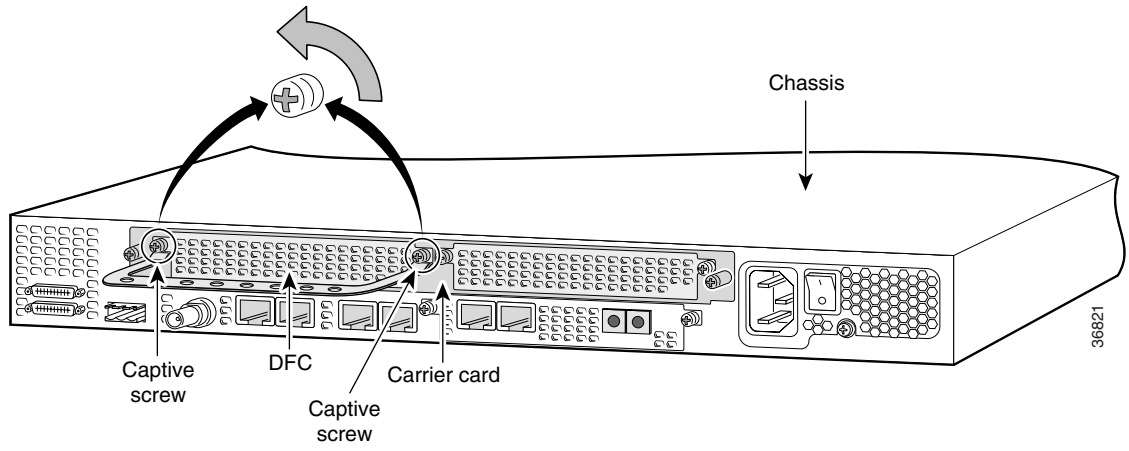
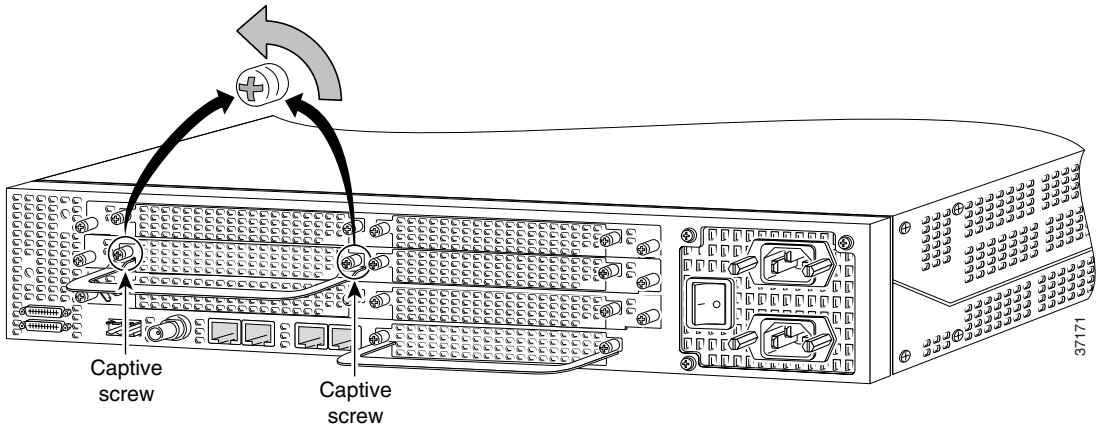


Figure 5-5 Loosening the Captive Screws on the Cisco AS5400XM Universal Gateway



Step 8 Grasp the feature card handle with one hand. Pull the card toward you until the card slides free of the chassis. Grasp the ventilated metal cover with your other hand to support and guide the feature card out of the slot. (See Figure 5-6 and Figure 5-7.)

Figure 5-6 Removing the Feature Card from the Cisco AS5350XM Universal Gateway

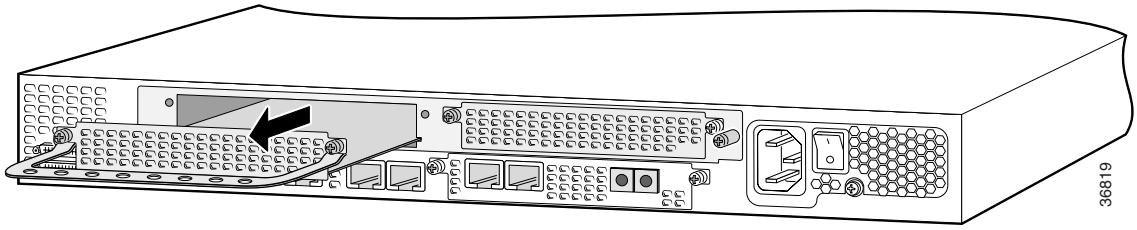
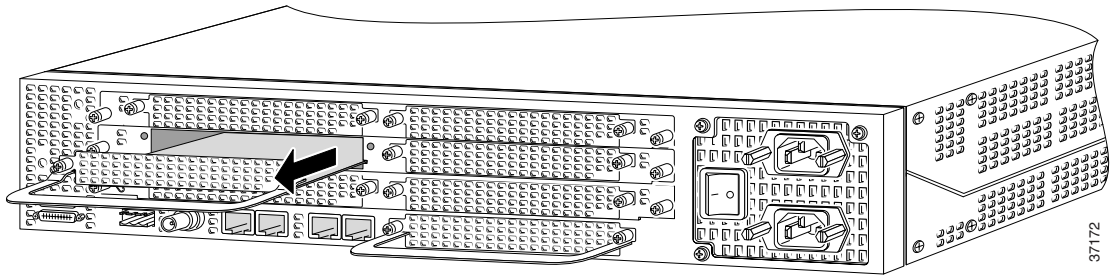


Figure 5-7 Removing the Feature Card from the Cisco AS5400XM Universal Gateway

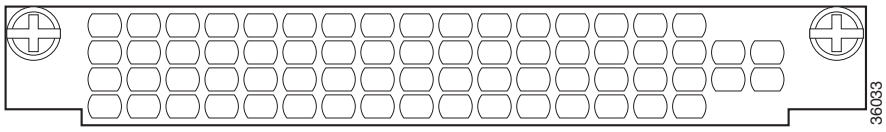


Caution Avoid touching any pins or circuit board components when you remove or install a feature card.

Step 9 After you remove the feature card, set it aside on an ESD-preventive mat.

Step 10 If the feature card slot is to remain empty, install a blank cover over the open feature card slot to ensure proper airflow inside the chassis. (See Figure 5-8.)

Figure 5-8 Blank Feature Card Cover



Online Insertion and Removal Example for the Universal Port or Dial-Only Feature Card

The following output is an example of the online insertion and removal (OIR) process for a universal port feature card in slot 3 of the universal gateway:

```
Router# show chassis slot 3

Slot 3:
DFC type is NP108 DFC

OIR events:
        Number of insertions = 0, Number of removals = 0
DFC State is DFC_S_OPERATIONAL

Router#
Router# show busyout 3
 Slot 3 is not being busied out
Router#
Router# busyout 3
Busyout in progress for 3
Router#
Router# show busyout 3
 Slot busyout is in progress
 Slot 3:Pending (64 calls remaining)
Router#
Router# show chassis slot 3

Slot 3:
DFC type is NP108 DFC
```

```
OIR events:
        Number of insertions = 0, Number of removals = 0
DFC State is DFC_S_OPERATIONAL

Router#
Router# clear port 3
This will clear ports 3/00 - 3/107[confirm]

Router#
*Jan  1 00:14:22.555:%PORT-6-SM_PORT_CLEARED:Port 3/00 - 3/107 Cleared
Router# show busyout 3
 Slot busyout is in progress
 Slot 3:Pending (54 calls remaining)
Router#
Router# show busyout 3
 Slot busyout is in progress
 Slot 3:Pending (36 calls remaining)
Router# show busyout 3
 Slot busyout is in progress
 Slot 3:Pending (30 calls remaining)
Router# clear port 3
This will clear ports 3/00 - 3/107[confirm]

Router#
*JRouteran  1 00:14:59.275:%PORT-6-SM_PORT_CLEARED:Port 3/00 - 3/107 Cleared
Router# show busyout 3
 Slot busyout is in progress
 Slot 3:Pending (9 calls remaining)
Router# clear port 3
*Jan  1 00:15:10.355:%NP_MD-6-MODULE_DOWN:NextPort module 3/0/0 down
*Jan  1 00:15:10.363:%NP_BS-6-MODULE_STOPPED:NextPort module 3/0/0 Stopped
*Jan  1 00:15:10.363:%NP_MD-6-MODULE_DOWN:NextPort module 3/0/1 down
*Jan  1 00:15:10.371:%NP_BS-6-MODULE_STOPPED:NextPort module 3/0/1 Stopped
*Jan  1 00:15:10.371:%NP_MD-6-MODULE_DOWN:NextPort module 3/0/2 down
*Jan  1 00:15:10.379:%NP_BS-6-MODULE_STOPPED:NextPort module 3/0/2 Stopped
*Jan  1 00:15:10.379:%NP_MD-6-SLOT_REMOVED:Slot 3 removed
Router# clear port 3
*Jan  1 00:15:10.539:%OIR-6-REMCARD:Card removed from slot 3, interfaces disabled
Router# show chassis slot 3

Slot 3:
DFC type is Empty DFC
DFC is not powered

OIR events:
        Number of insertions = 0, Number of removals = 1

Router#
Router#
*Jan  1 00:16:29.047:%OIR-6-INSCARD:Card inserted in slot 3, interfaces administratively
shut down
*Jan  1 00:16:29.123:%NP_MD-6-SLOT_INSERTED:Slot 3 (108 ports max) inserted
Router#
*Jan  1 00:16:33.415:%NP_BS-6-MODULE_STARTED:NextPort module 3/0/0 Started - 1.1.3.77
Router#
*Jan  1 00:16:37.843:%NP_BS-6-MODULE_STARTED:NextPort module 3/0/1 Started - 1.1.3.77
*Jan  1 00:16:40.615:%NP_MD-6-MODULE_UP:NextPort module 3/0/0 up
Router#
*Jan  1 00:16:41.847:%NP_BS-6-MODULE_STARTED:NextPort module 3/0/2 Started - 1.1.3.77
Router#
```

```
Router# show chassis slot 3

Slot 3:
DFC type is NP108 DFC

OIR events:
        Number of insertions = 1, Number of removals = 1
DFC State is DFC_S_OPERATIONAL
```

Installing the Universal Port or Dial-Only Feature Card

Warning **Do not work on the system or connect or disconnect cables during periods of lightning activity.** Statement 1001

Note When you replace a feature card with a new feature card of the same type in the same slot, the system software recognizes the new feature card and brings up the trunk interfaces automatically. If you replace the existing feature card with a new feature card of a different type, you must reconfigure the system. For configuration details, see the *Cisco AS5350XM and Cisco AS5400XM Universal Gateways Software Configuration Guide*.

To install the universal port or dial-only feature card, follow these steps:

Step 1 Attach an ESD-preventive wrist strap.

Step 2 Slide the feature card into the slot until the connector pins make contact with the carrier card backplane connector. (See Figure 5-9 and Figure 5-10.)

Figure 5-9 Installing the Universal Port or Dial-Only Feature Card in the Cisco AS5350XM Universal Gateway

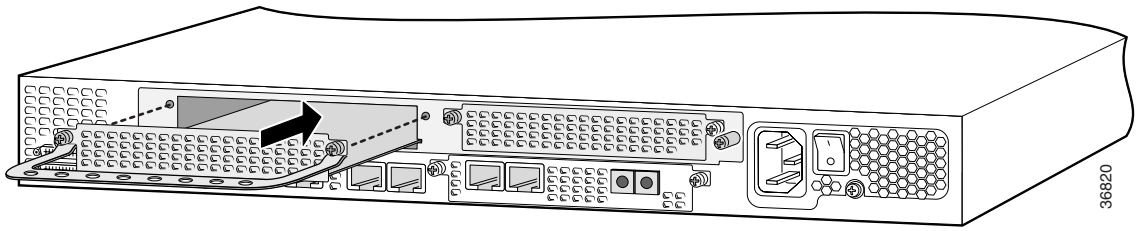
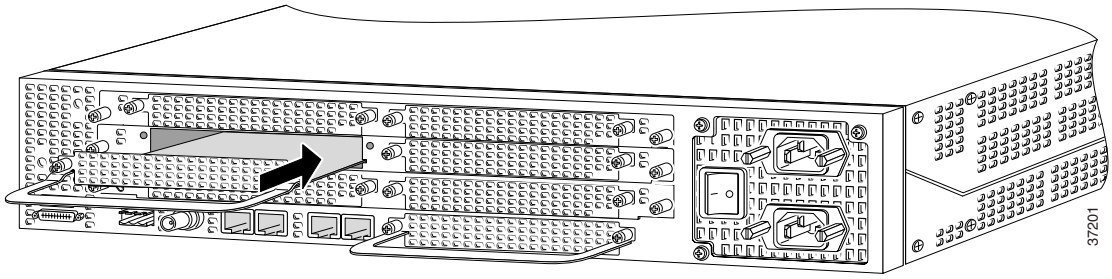


Figure 5-10 Installing the Universal Port or Dial-Only Feature Card in the Cisco AS5400XM Universal Gateway



Step 3 Align the captive screws with their holes, and then seat the card completely.

Step 4 Seat the feature card in the carrier by pushing the card firmly until the captive screws are aligned with their holes.

Step 5 Tighten the screws to secure the feature card to the chassis. (See Figure 5-11 and Figure 5-12.)

Figure 5-11 Tightening the Captive Screws on the Cisco AS5350XM Universal Gateway

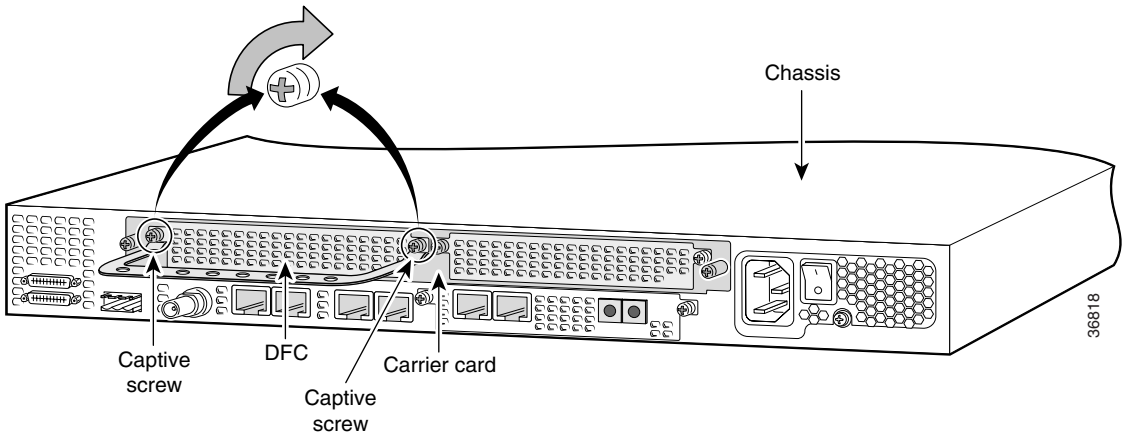
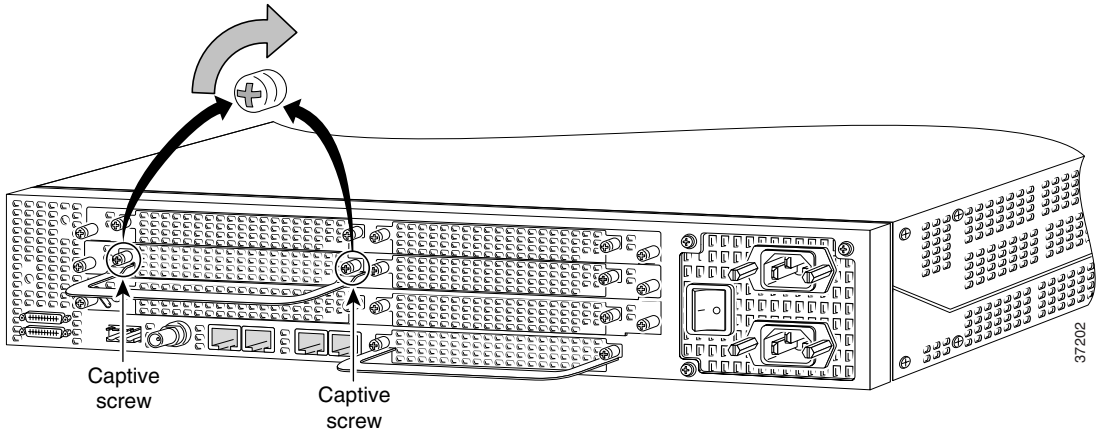


Figure 5-12 Tightening the Captive Screws on the Cisco AS5400XM Universal Gateway



Step 6 Check the card LEDs to verify that the card is working properly. For information about feature card LEDs, see Chapter 7, "Troubleshooting."

System Processing Engine Firmware

System processing engine (SPE) firmware is automatically downloaded to a universal port or dial-only feature card from the Cisco IOS image when you boot the system for the first time, or when you insert a universal port or dial-only feature card while the system is operating. When you insert feature cards while the system is operating, the Cisco IOS image recognizes the cards and downloads the required firmware to the cards.

For more information on universal port and dial-only feature card firmware and upgrade options, see the *Cisco AS5350XM and Cisco AS5400XM Universal Gateways Software Configuration Guide*.

Getting Help

For information about technical support, onsite service, and exchange and repair services, see the "Obtaining Technical Assistance" section on page xvi.

Where to Go Next

The remaining chapters of this guide include information about installing and troubleshooting feature cards and about building cables.

- Chapter 6, "Voice Feature Card"
- Chapter 7, "Troubleshooting"
- Appendix A, "Cabling Specifications"

Voice Feature Card

This chapter describes the voice feature card and includes the following sections:

- Overview, page 6-1
- Online Insertion and Removal of the Voice Feature Card, page 6-3
- Replacing PVDM2 Modules in the Voice Feature Card, page 6-8
- Getting Help, page 6-11
- Where to Go Next, page 6-11

Overview

High-density packet voice digital signal processor (DSP) modules (PVDM2) installed on the voice feature card convert voice and fax calls into IP packets or frames that can be transmitted as voice over IP (VoIP) over a variety of transport technologies on Cisco AS5350XM and Cisco AS5400XM universal gateways. The number of calls supported depends on the number of PVDM2 modules installed on the voice feature card, and the number of voice feature cards installed in the chassis.

The voice feature card supports a 64-channel PVDM2 (AS5X-PVDM2-64) module. You can install up to six AS5X-PVDM2-64 modules on each voice feature card. Table 6-1 describes the maximum number of channels supported by each AS5X-PVDM2-64 module and the maximum number of channels supported by a voice feature card with six AS5X-PVDM2-64 modules installed.

Table 6-1 Maximum Number of Channels Available on a Voice Feature Card with AS5X-PVDM2-64 Modules

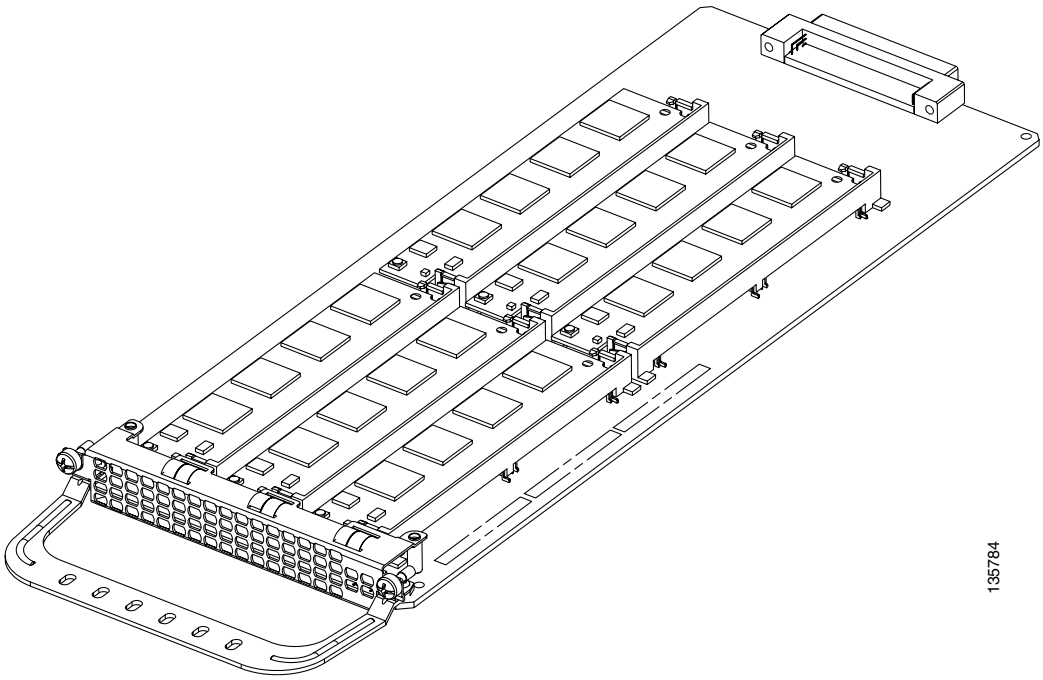
Codec Type	Maximum Number of Channels per AS5X-PVDM2-64	Maximum Number of Channels per Voice Feature Card
Low complexity (G.711)	64	384
Medium complexity (G.726, G.729a, G.729ab, T.38 fax relay)	32	192
High complexity (G.729, G.729b, G.723.1, GSM-AMR, modem relay)	24	144

Note A Cisco AS5350XM or Cisco AS5400XM universal gateway with the maximum number of PVDM2 modules installed can take up to 6 minutes to boot from power-on to system ready.

For configuration details, see the *Cisco AS5350XM and Cisco AS5400XM Universal Gateways Software Configuration Guide*. For information on voice and fax commands, see the Cisco IOS Voice Configuration Library for your Cisco IOS software release at Cisco.com.

You can install a voice feature card in any card slot of the universal gateway chassis. The voice feature card does not require external connections. (See Figure 6-1.)

Figure 6-1 Voice Feature Card



Restrictions for the Voice Feature Card

Voice feature cards are not compatible with universal port and dial-only feature cards. Voice feature cards should not be installed on any system that has universal port and dial-only feature cards. Table 6-2 describes the behavior of the Cisco AS5350XM and Cisco AS5400XM universal gateways depending on whether the voice feature card is present at power on.

Table 6-2 Voice Feature Card Support During Power On

Feature Cards Present at Power On	Feature Cards Supported
Voice feature card present at power on	Voice feature card only. Any universal port and dial-only feature cards present will not be operational until the voice feature card is removed and the system is rebooted.
Voice feature card not present at power on	Universal port or dial-only feature cards only. Any voice feature card installed later will not be operational until the system is rebooted.

Note If you plan to use voice feature cards, at least one voice feature card must be present when the universal gateway is powered on. More voice feature cards can be installed later.

Online Insertion and Removal of the Voice Feature Card

To remove a feature card without dropping any calls or connections, you will need to take the feature card out of service by using the **busyout** command to disable the feature card. The **busyout** command is executed on a per–feature card basis and will disable the card after waiting for the active services to terminate.

If there are active calls on the feature card after you execute the **busyout** command, wait for the calls to drop. To view the status of the termination process, use the **show busyout** command.

Caution The online installation and removal (OIR) of new cards should be done *only* during times of low CPU utilization, such as during maintenance.

Caution To avoid erroneous failure messages, remove or insert only one feature card at a time.

When you replace a feature card with a new feature card of the same type in the same slot, the system software recognizes the new feature card and brings up the interface automatically.

If you replace the existing feature card with a new feature card of a different type, you must reconfigure the system. For configuration details, see the *Cisco AS5350XM and Cisco AS5400XM Universal Gateways Software Configuration Guide*. For information on voice and fax commands, see the Cisco IOS Voice Configuration Library for your Cisco IOS software release at Cisco.com.

Note To use the voice feature card, at least one voice feature card must be present when the universal gateway is powered on. More voice feature cards can be inserted later. See the "Restrictions for the Voice Feature Card" section on page 6-2 for more information.

Removing the Voice Feature Card

To remove the voice feature card, follow these steps.

Note An example showing the output from each command is provided after the procedure. See the "Online Insertion and Removal Example for the Voice Feature Card" section on page 6-6.

Step 1 Determine which slot the feature card is in (see Figure 6-2 and Figure 6-3) by entering the **show chassis slot** command in privileged EXEC mode:

```
Router# show chassis slot
```

Note These commands are not valid for slot 0. Slot 0 is the motherboard.

Figure 6-2 Slot Numbering on the Cisco AS5350XM Chassis

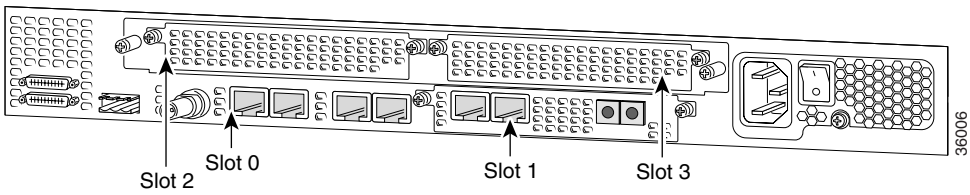
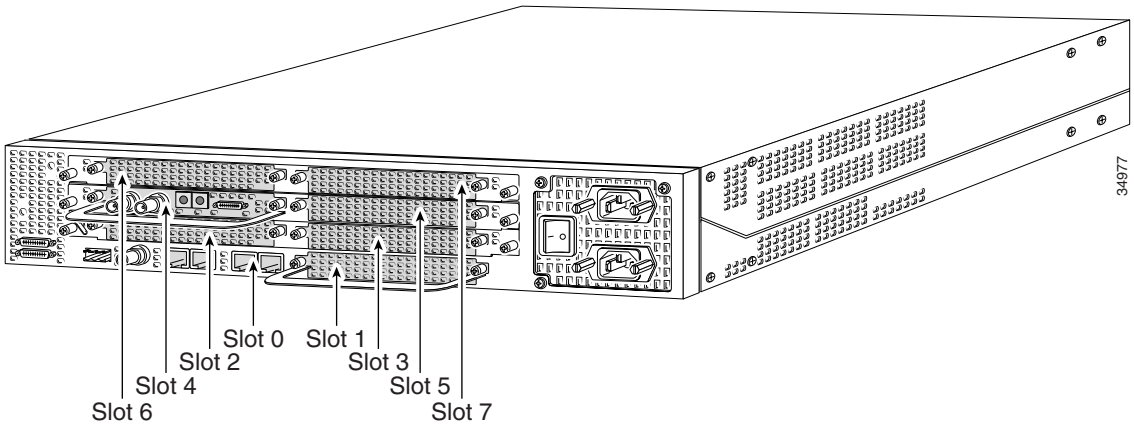


Figure 6-3 Slot Numbering on the Cisco AS5400XM Chassis



Step 2 Initialize the software busyout procedure by entering the **busyout** command:

```
Router# busyout slot-number
```

Step 3 Check busyout status for the slot, by entering the **show busyout** command.

```
Router# show busyout slot-number
```

Timesaver You can use the **clear voice dsp** command to immediately disable active calls on the voice feature card.

Step 4 Verify that the OK/MAINT LED is off; this indicates that the feature card is offline and ready to be removed.

Note The OK/MAINT LED is green before you enter the **busyout** command. After you enter the **busyout** command, the LED changes to yellow. The LED turns off after all calls are disconnected and resources taken out of service, indicating that busyout is complete.

Step 5 Attach an ESD-preventive wrist strap.

Warning **Do not work on the system or connect or disconnect cables during periods of lightning activity.** Statement 1001

Step 6 Loosen the two captive screws that secure the feature card to the chassis until each screw is free of the chassis. (See Figure 6-4 and Figure 6-5.)

Figure 6-4 Loosening the Captive Screws on the Cisco AS5350XM Universal Gateway

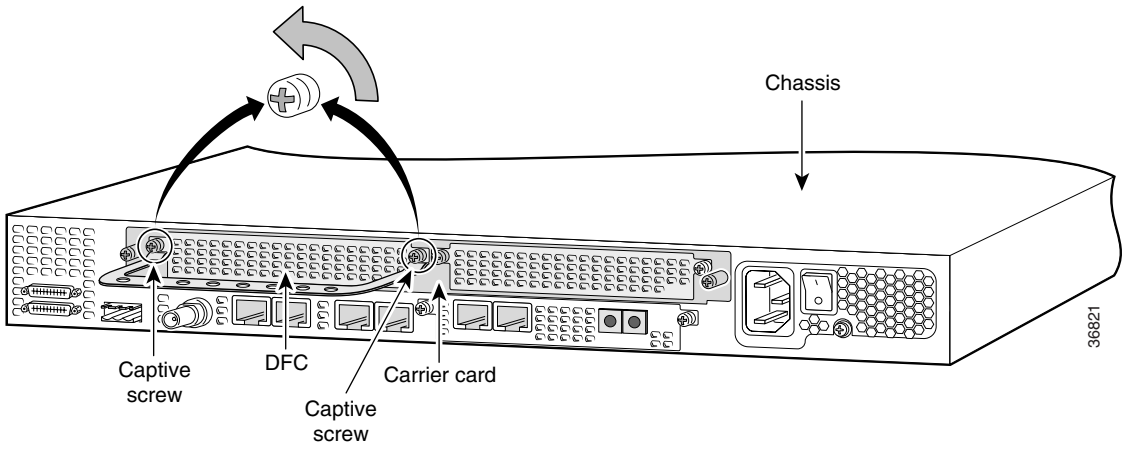
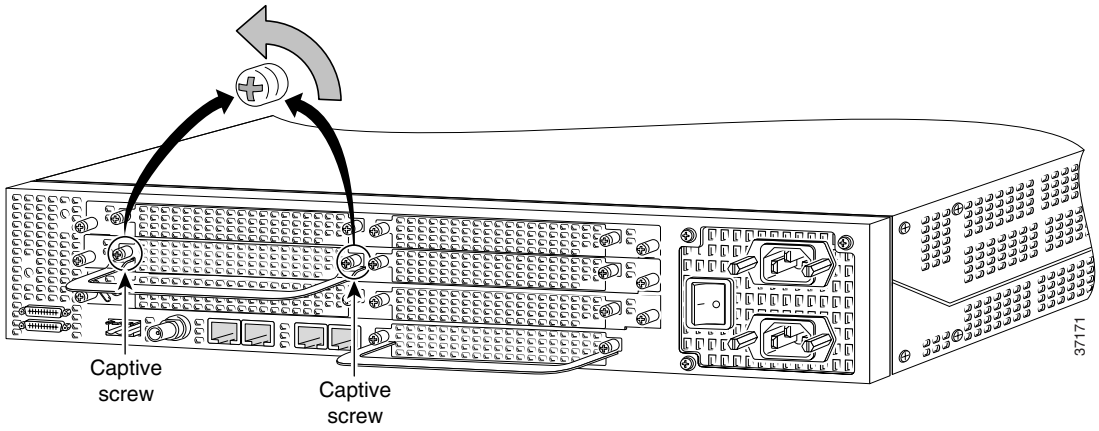


Figure 6-5 Loosening the Captive Screws on the Cisco AS5400XM Universal Gateway



Step 7 Grasp the feature card handle with one hand. Pull the card toward you until the card slides free of the chassis. Grasp the sheet metal on each side of the feature card with your other hand to support and guide the feature card out of the slot. (See Figure 6-6 and Figure 6-7.)

Figure 6-6 Removing a Feature Card from the Cisco AS5350XM Universal Gateway

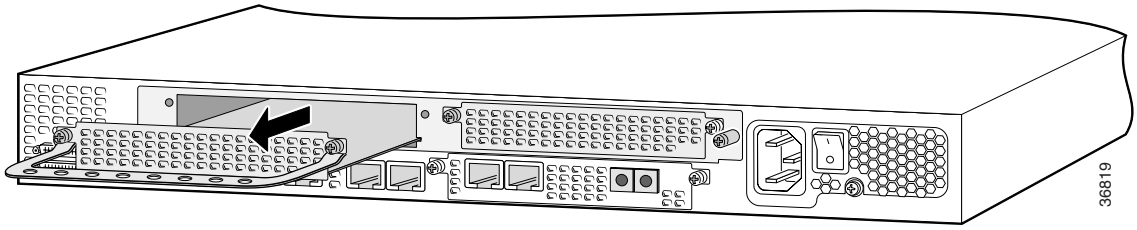
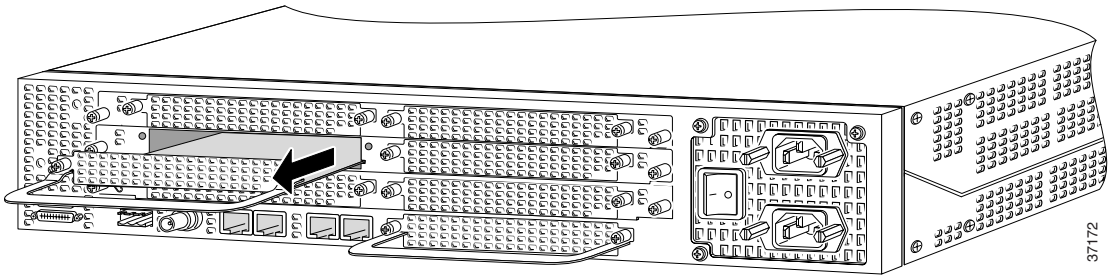


Figure 6-7 Removing a Feature Card from the Cisco AS5400XM Universal Gateway

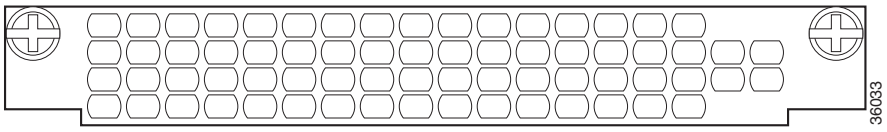


Caution Avoid touching any pins or circuit board components when you remove or install a feature card.

Step 8 After you remove the feature card, set it aside on an ESD-preventive mat.

Step 9 If the feature card slot is to remain empty, install a blank cover over the open card slot to ensure proper airflow inside the chassis. (See Figure 6-8.)

Figure 6-8 Blank Feature Card Cover



Online Insertion and Removal Example for the Voice Feature Card

The following output is an example of the online insertion and removal (OIR) process for a voice feature card in slot 3 of the universal gateway:

```
Router# show chassis slot 3

Slot 3:
DFC type is AS5400XM AS5X-FC

OIR events:
        Number of insertions = 0, Number of removals = 0
DFC State is DFC_S_OPERATIONAL

Router# busyout 3
Busyout in progress for 3

Router# show busyout 3
OIR cleanup in progress for slot 3.

Router# show busyout 3
DFC in slot 3 is powered down.

Router# show chassis slot 3

Slot 3:
DFC type is AS5400XM AS5X-FC
DFC is not powered
```

```
OIR events:
        Number of insertions = 0, Number of removals = 1
DFC State is DFC_S_REMOVED
```

Installing the Voice Feature Card

Warning **Do not work on the system or connect or disconnect cables during periods of lightning activity.** Statement 1001

Note When you replace a feature card in a slot with a new feature card of the same type, the system software recognizes the new feature card and brings up the trunk interfaces automatically. If you replace the existing feature card with a new feature card of a different type, you must reconfigure the system. For configuration details, see the *Cisco AS5350XM and Cisco AS5400XM Universal Gateways Software Configuration Guide*.

To install the voice feature card, follow these steps:

Step 1 Attach an ESD-preventive wrist strap.

Step 2 Slide the feature card into the slot until the connector pins make contact with the carrier card backplane connector. (See Figure 6-9 and Figure 6-10.)

Figure 6-9 Installing a Feature Card in the Cisco AS5350XM Universal Gateway

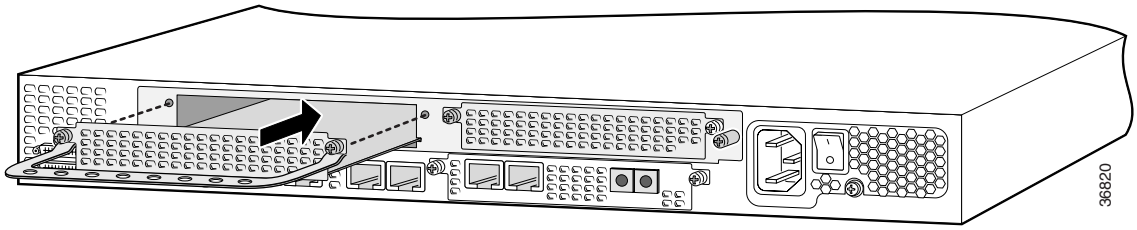
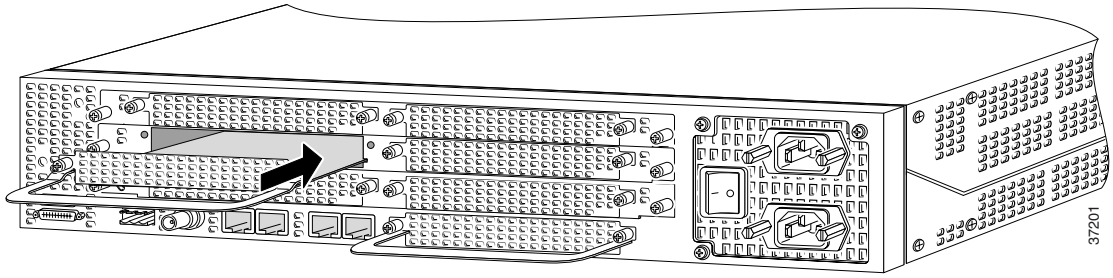


Figure 6-10 Installing a Feature Card in the Cisco AS5400XM Universal Gateway



Step 3 Align the captive screws with their holes, and then seat the card completely.

Step 4 Seat the feature card in the carrier by pushing the card firmly until the captive screws are aligned with their holes.

Step 5 Tighten the screws to secure the feature card to the chassis. (See Figure 6-11 and Figure 6-12.)

Figure 6-11 Tightening the Captive Screws on the Cisco AS5350XM Universal Gateway

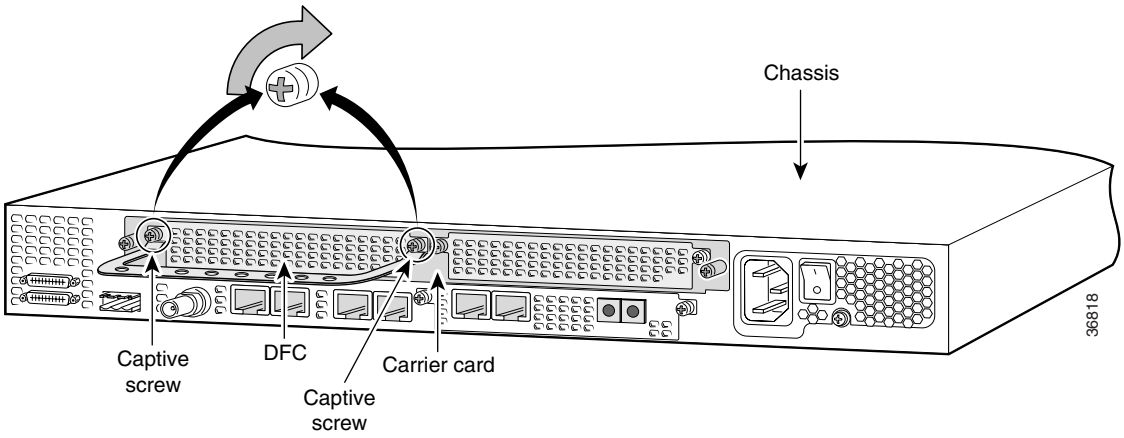
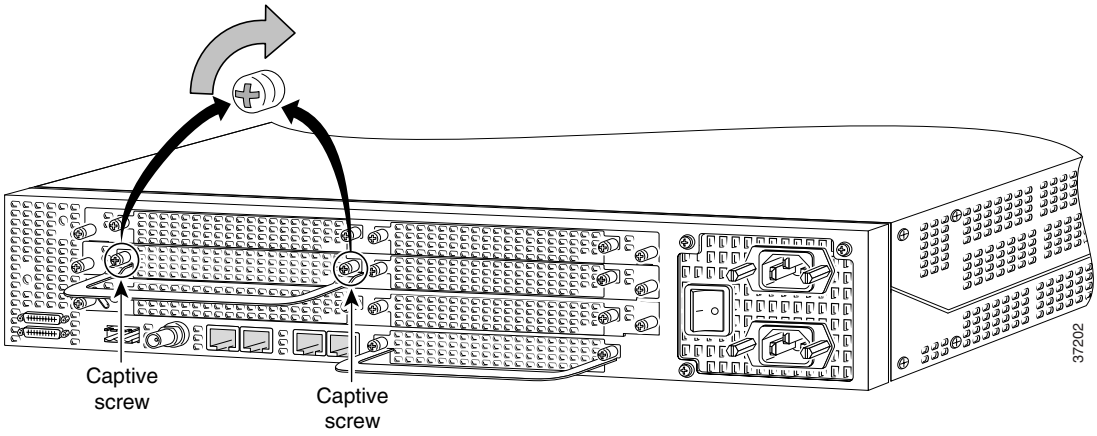


Figure 6-12 Tightening the Captive Screws on the Cisco AS5400XM Universal Gateway



Step 6 Check the OK/MAINT LED to verify that the card is working properly. For information about the voice feature card LED, see the "LEDs" section on page 7-1.

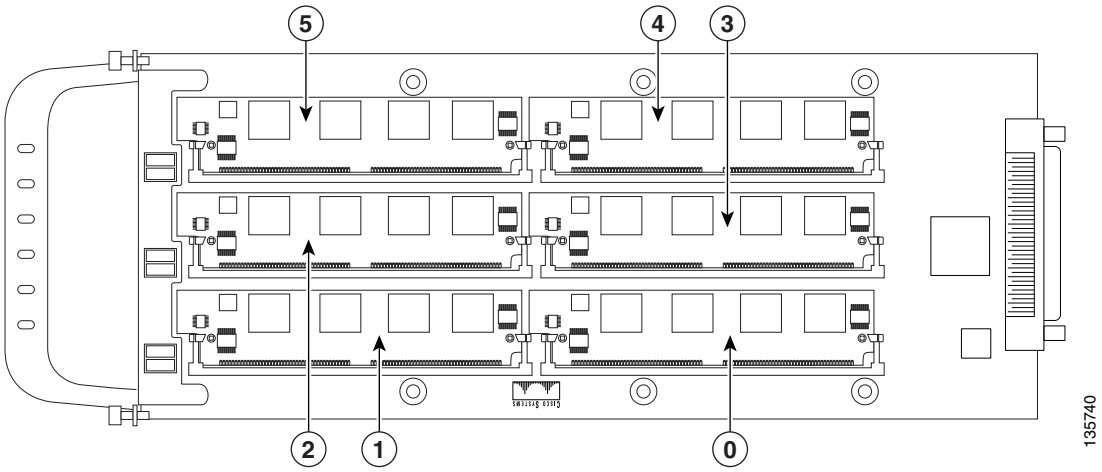
Note To use the voice feature card, at least one voice feature card must be present when the universal gateway is powered on. More voice feature cards can be inserted later. See the "Restrictions for the Voice Feature Card" section on page 6-2 for more information.

Replacing PVDM2 Modules in the Voice Feature Card

The voice feature card contains six 80-pin SIMM sockets for PVDM2 modules, numbered 0 through 5. (See Figure 6-13.) Each socket can be filled with a single 80-pin PVDM2 module.

Note The voice feature card supports a 64-channel PVDM2 (AS5X-PVDM2-64) module.

Figure 6-13 PVDM2 Slot Locations

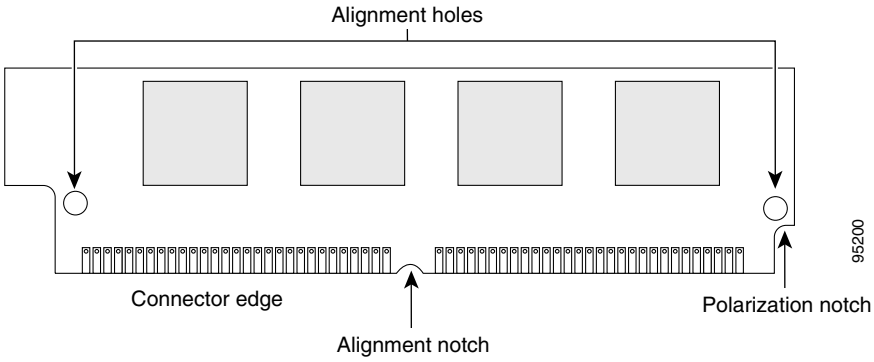


Orienting the PVDM2 Module During Installation

The PVDM2 modules are manufactured with a polarization notch to ensure proper orientation, and with alignment holes to ensure proper positioning. Figure 6-14 shows the polarization notch and alignment holes on a PVDM2 module. PVDM2 modules are installed with the connector edge down.

Caution To avoid damaging ESD-sensitive components, observe all ESD precautions. To avoid damaging the voice feature card, avoid using excessive force when you remove or replace PVDM2 modules.

Figure 6-14 PVDM2 Orientation



Removing PVDM2 Modules From the Voice Feature Card

To remove PVDM2 modules from the voice feature card, perform the following steps:

Step 1 Attach an ESD-preventive wrist strap.

Step 2 Find the appropriate PVDM2 slot on the voice feature card. (See Figure 6-13.)

Caution Handle PVDM2 modules by the card edges only. PVDM2 modules are ESD-sensitive components and can be damaged by mishandling.

Step 3 Remove one PVDM2 module at a time. To lift the PVDM2 module out of its socket, pull the locking spring clips on both sides outward and tilt the PVDM2 up, free of the clips.

Step 4 Hold the PVDM2 module by the edges with your thumb and index finger and lift it out of the socket. Place the removed PVDM2 module in an antistatic bag to protect it from ESD damage.

Step 5 Repeat Step 2 through Step 4 for each PVDM2 module you are removing.

Installing PVDM2 Modules in the Voice Feature Card

To install PVDM2 modules in the voice feature card, perform the following steps:

Step 1 Attach an ESD-preventive wrist strap.

Step 2 Find the appropriate PVDM2 slot on the voice feature card. (See Figure 6-13.)

Caution Handle PVDM2 modules by the card edges only. PVDM2 modules are ESD-sensitive components and can be damaged by mishandling.

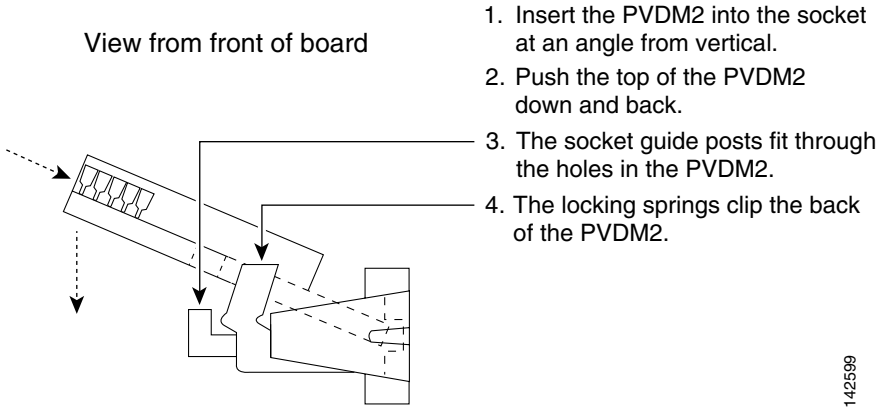
Step 3 Hold the PVDM2 module with the polarization notch pointing toward the back of the voice feature card, with the connector edge pointing down. (See Figure 6-14.)

Caution It is normal to feel some resistance, but do not use excessive force to install the PVDM2 module into the socket, and do not touch the surface components. If the PVDM2 module does not fit easily into the socket, remove it and check the orientation of the alignment holes and polarization notch.

Step 4 Insert the PVDM2 module into the connector slot at approximately a 45 degree angle to the voice feature card. (See Figure 6-15.) Gently press the PVDM2 module down, using as little force as possible. When the PVDM2 module is properly seated, the socket guide posts fit through the alignment holes, and the connector springs click into place.

Step 5 Ensure that each PVDM2 module is straight and that the alignment holes (as shown in Figure 6-15) line up with the plastic guides on the socket.

Figure 6-15 Installing PVDM2 Modules in the Voice Feature Card


View from front of board
1. Insert the PVDM2 into the socket at an angle from vertical.
2. Push the top of the PVDM2 down and back.
3. The socket guide posts fit through the holes in the PVDM2.
4. The locking springs clip the back of the PVDM2.
142599

Step 6 Repeat Step 2 through Step 5 for each PVDM2 module.

Note When the voice feature card is installed and running, you can check that the PVDM2 modules are installed correctly by entering the **show voice dsp summary** command. If an installed PVDM2 module is missing from the output, try reseating the PVDM2 module.

Digital Signal Processor Firmware

Digital signal processor (DSP) firmware is automatically downloaded to the voice feature card from the Cisco IOS image when you boot the system for the first time, or when you insert a voice feature card while the system is operating. When you insert feature cards while the system is operating, the Cisco IOS image recognizes the cards and downloads the required firmware to the cards.

For more information on voice feature card firmware and upgrade options, see the *Cisco AS5350XM and Cisco AS5400XM Universal Gateways Software Configuration Guide*.

Getting Help

For information about technical support, onsite service, and exchange and repair services, see the "Obtaining Technical Assistance" section on page xvi.

Where to Go Next

The remaining chapters of this guide include information on troubleshooting feature cards and building cables.

- Chapter 7, "Troubleshooting"
- Appendix A, "Cabling Specifications"

Troubleshooting

This chapter describes how to troubleshoot the universal gateway by referring to the LEDs on feature cards and using the bantam jack ports. The chapter contains the following sections:

- LEDs, page 7-1
- Mixing WAN Feature Cards, page 7-5
- Mixing Universal Port and Dial-Only Feature Cards, page 7-6
- Mixing Voice Feature Cards With Universal Port and Dial-Only Feature Cards, page 7-6
- Monitoring the Chassis Environment, page 7-7
- Using the Bantam Jack Ports to Monitor T1, E1, and CT3 Feature Cards, page 7-10
- Using Drop and Insert Mode on the CT3 Feature Card, page 7-10
- Troubleshooting Network Interfaces, page 7-11
- Getting Help, page 7-11

LEDs

The LEDs indicate the current operating condition of the feature cards. Observe the LEDs (see Figure 7-1 through Figure 7-4), note any fault condition that the product is encountering, and then contact your system administrator or a customer service representative. (See the "Obtaining Technical Assistance" section on page xvi, if necessary.) Table 7-1 describes the LEDs.

Figure 7-1 2-Port or 4-Port T1 or E1 Feature Card LEDs (2-Port T1 or E1 Feature Card Shown)

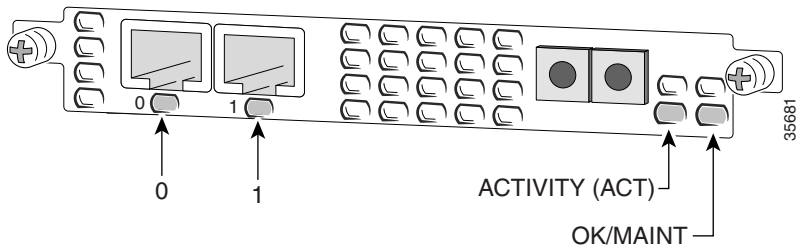


Figure 7-2 8-Port T1 or E1 Feature Card LEDs

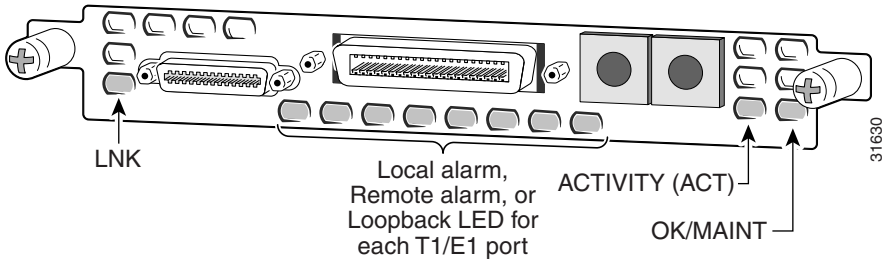


Figure 7-3 Channelized T3 (CT3) Feature Card LEDs

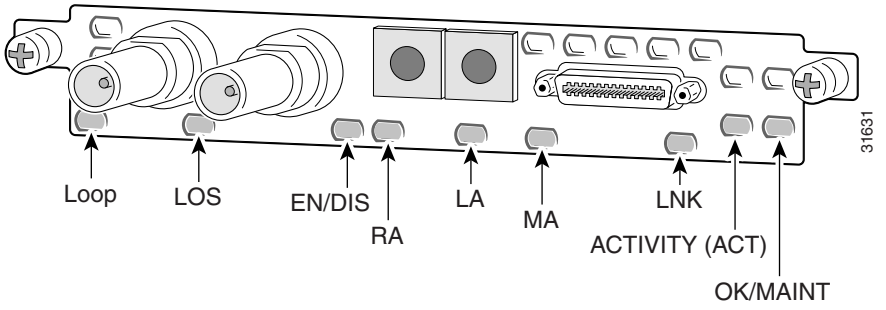


Figure 7-4 Universal Port Feature Card, Dial-Only Feature Card, and Voice Feature Card LEDs

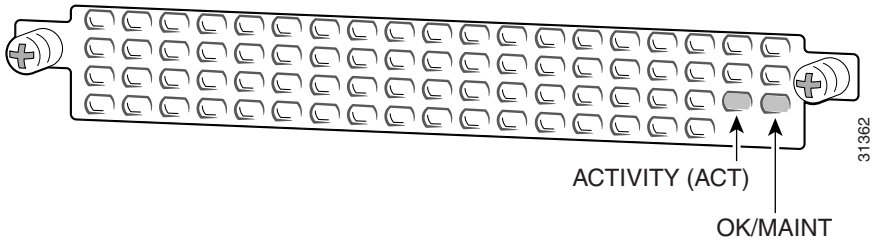


Table 7-1 LEDs

Feature Card	LED	State	Description
T1 or E1 feature card	ACTIVITY (ACT)	Fast flicker (green)	The feature card is up and running.
		Slow flicker (green)	The feature card is not yet fully functional.
	OK/MAINT	Green	The feature card has passed initial power-up diagnostics tests and is operating normally.
		Yellow	• The feature card is busied out, but there are active calls. Once all the calls are terminated the feature card will be powered off. • The feature card is not functioning correctly.
		Off	All calls associated with the card have been shut down, and it is safe to remove the card with the system powered on.
	• Remote Alarm (RA) • Local Alarm (LA) • Loopback (LB)	On (yellow)	One LED below each T1/E1 port indicates one of the following: • A local or remote loopback diagnostic test is running on the associated T1 port. • An alarm has been received on the associated T1/E1 port, indicating loss of signal (LOS) or loss of multiframe alignment (LOF) at the local or remote node.

Table 7-1 LEDs (continued)

Feature Card	LED	State	Description
CT3 feature card	ACTIVITY (ACT)	Fast flicker	The feature card is up and running.
		Slow flicker	The feature card is not yet fully functional.
	OK/MAINT	On (green)	The feature card passed initial power-up diagnostics tests and is operating normally.
		Yellow	• The feature card is busied out, but there are active calls. Once all the calls are terminated the feature card will be powered off. • The feature card is not functioning correctly.
		Off	All calls associated with the feature card have been shut down, and it is safe to remove the card with the system powered on.
	M13 Alarm (MA)	On	One of the following is present on the T3 line: • Received alarm indication signal (RAIS) • Loss of signal (LOS) • Receive RED alarm (RRED) • Far-end receive failure (RFERF)[1]
		Off	The operating condition is normal.
	Remote Alarm (RA)	On	A T1 alarm condition has been encountered by software.
		Off	The operating condition is normal.
	Local Alarm (LA)	On	A T1 alarm condition has been encountered by software for a particular port.
		Off	The operating condition is normal.
	T3 EN/DIS	Green	A CT3 feature card line connection exists, enabling normal operation.
		Yellow	Normal operation is disabled.
	Low signal (LOS)	On	The T3 line interface unit (LIU) is experiencing a loss of signal.
		Off	Remains off when operating condition is normal.
	Network Loop (LOOP)	On	At least one T1 is unavailable.
		Off	The operating condition is normal.

Table 7-1 LEDs (continued)

Feature Card	LED	State	Description
Universal port and dial-only feature card	ACTIVITY (ACT)	Flickering	There is call activity on the feature card.
	OK/MAINT	Green	The feature card passed initial power-up diagnostic tests and is operating normally.
		Yellow	• The feature card is busied out, but there are active calls. Once all the calls are terminated the feature card will be powered off. • The feature card is not functioning correctly.
		Off	All calls associated with the feature card have been shut down, and it is safe to remove the card with the system powered on.
Voice feature card	ACTIVITY	Green (blinking)	There is call activity on the feature card.
		Off	There is no activity on the feature card.
	OK/MAINT	Green	The feature card passed initial power-up diagnostic tests and is operating normally.
		Yellow	• The feature card is busied out, but there are active calls. Once all the calls are terminated the feature card will be powered off. • The feature card is not functioning correctly.
		Off	All calls associated with the feature card have been shut down, and it is safe to remove the card with the system powered on.

1. To display information about an M13 alarm, use the **show controllers t3** user EXEC command.

Mixing WAN Feature Cards

The Cisco AS5350XM and Cisco AS5400XM universal gateways support only one type of WAN feature card at a time. The feature cards that can be installed at one time are:

- Up to three T1 feature cards (any combination of 2-, 4-, or 8-port) or
- Up to three E1 feature cards (any combination of 2-, 4-, or 8-port) or
- One CT3 feature card or
- One CT3 feature card and up to two T1 feature cards (any combination of 2-, 4-, or 8-port)

The universal gateway software recognizes feature cards in the order of the slots they are in. For example, a feature card in slot 2 is recognized before a feature card in slot 3. The system recognizes whether there is a mix of WAN feature cards during both power up and OIR:

- During power up, the first WAN feature card recognized by the system is the only type brought up.
- If there are two or more WAN feature cards of the same type and one is hot-swapped with another of a different type, the new one is not recognized.

In both situations, an error message will appear on the console that is similar to this example:

```
00:01:12:%CARRIER-2-T1_E1_MIX:Cannot mix T1 and E1 8PRI DFC cards in chassis, do not power
up invalid card in slot 7
```

Mixing Universal Port and Dial-Only Feature Cards

If a dial-only feature card is installed in a chassis with the universal port feature card, only dial services are supported. Table 7-2 describes the behavior of the Cisco AS5350XM and Cisco AS5400XM universal gateways with dial-only feature cards, universal port feature cards, or both installed in the chassis.

Caution We do not recommend deploying dial-only feature cards in a chassis that supports voice and fax services, because voice or fax calls assigned to the dial-only feature card will fail.

Table 7-2 Universal Port and Dial-Only Feature Card Supported Features

Feature Cards Installed	Services Supported
Only dial-only feature cards installed	Dial services
Only universal port feature cards installed	Dial, voice, and fax services
Both universal port and dial-only feature cards installed	Dial services

Mixing Voice Feature Cards With Universal Port and Dial-Only Feature Cards

Voice feature cards are not compatible with universal port and dial-only feature cards. Voice feature cards should not be installed on any system that has universal port and dial-only feature cards. Table 7-3 describes the behavior of the Cisco AS5350XM and Cisco AS5400XM universal gateways depending on whether the voice feature card is present at power on.

Table 7-3 Voice Feature Card Support During Power On

Feature Cards Present at Power On	Feature Cards Supported
Voice feature card present at power on	Voice feature card only. Any universal port and dial-only feature cards present will not be operational until the voice feature card is removed and the system is rebooted.
Voice feature card not present at power on	Universal port or dial-only feature cards only. Any voice feature card installed later will not be operational until the system is rebooted.

Note If you plan to use voice feature cards, at least one voice feature card must be present when the universal gateway is powered on. More voice feature cards can be installed later.

Monitoring the Chassis Environment

The Cisco AS5350XM and Cisco AS5400XM universal gateways contain temperature sensors to detect abnormal temperature conditions during system operation. The three levels of sensor detection are as follows:

1. When the operating temperature of the system exceeds 113° F (45° C), the system reaches a warning state. A warning message appears on the console. When the operating temperature of the system drops below 113° F (45° C), another message is displayed on the console, indicating a recovery. At this level of sensor detection, there is no disruption in system operation.
2. When the operating temperature of the system continues to rise above 113° F (45° C) and reaches a temperature of 140° F (60° C), the system reaches a critical state.

   Cisco IOS software busys out the feature cards in the chassis and shuts down the first feature card. If the operating temperature continues to be critical after 10 minutes, Cisco IOS software shuts down another feature card.

Note Feature card slot numbering starts at the system board and slots are numbered sequentially from the bottom row up, left to right. Slot 0 is reserved for the motherboard. (See Figure 7-5 and Figure 7-6.)

Figure 7-5 Slot Numbering on the Cisco AS5350XM Chassis

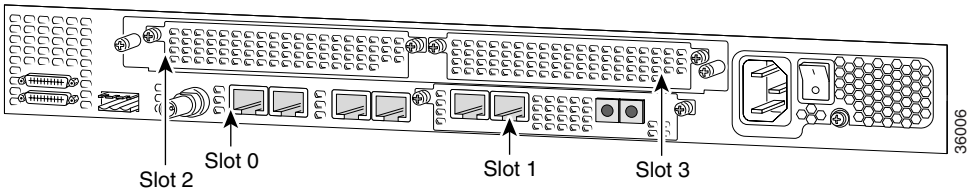
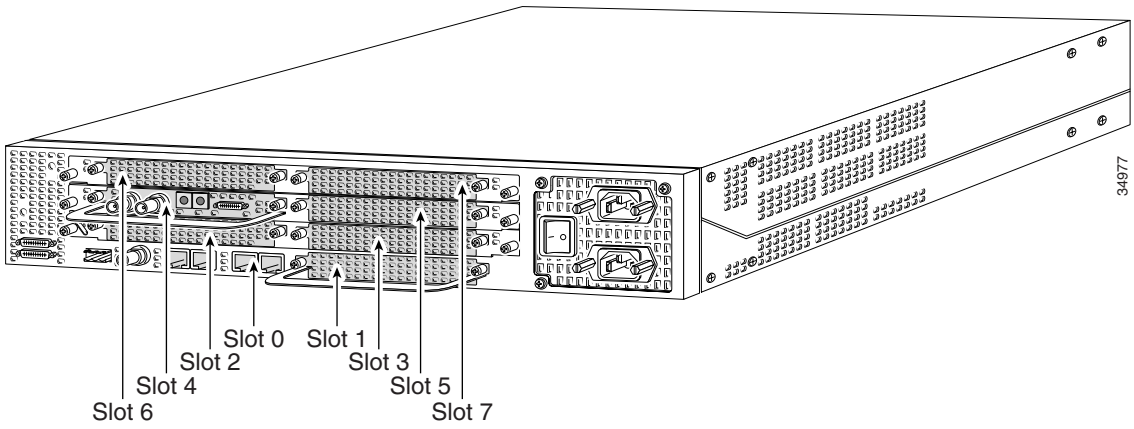


Figure 7-6 Slot Numbering on the Cisco AS5400XM Chassis



The busyout process is repeated at 10-minute intervals until the final feature card is shut down. The console displays the slot number of the feature card and the type of feature card that was shut down.

If the operating temperature cools down to 113° F (45° C), Cisco IOS software powers on the first feature card, repeating the process for each feature card at 10-minute intervals.

3. When the operating temperature of the system rises above 149° F (65° C), Cisco IOS software shuts down all feature cards immediately.

Displaying Environment Status

You can use the command-line interface (CLI) to check environment monitoring status of your universal gateway.

To check environment status, enter the **show environment** command in privileged EXEC mode.

```
Router# show environment
```

- The output shown below displays on your console during normal operating conditions. The slot number corresponds to the feature card in that slot. The outlet and inlet sensors read the temperature of the air circulating inside the chassis.

```
Router# show environment
Temperature:
        Temperature Reading:
                Temperature at inlet is measured as 22C/71F.
                Temperature at outlet is measured as 27C/80F.
        Temperature State:
                Temperature is in normal state.
Fans:
        Fans temperature delta is measured as 5C.
        All fans are running well.
Power Supply:
        Redundant Power System is present.
```

- The output shown below displays on your console when the system reaches a warning state:

```
Router# show environment
Temperature:
        Temperature Reading:
                Temperature at inlet is measured as 52C/125F.
                Temperature at outlet is measured as 64C/147F.
        Temperature State:
                Temperature is in warning state.
Fans:
        Fans temperature delta is measured as 6C.
        All fans are running well.
Power Supply:
        Redundant Power System is present.
        RPS Input Voltage status: normal
        RPS Output Voltage status: normal
        RPS Fan status: normal
        RPS Thermal status: normal
        RPS OverVoltage status: normal
Environmental monitor experienced the following events:
        Temperature:sensor failed.
        Fans:monitor dropped.
        Temperature:warning.
        Temperature:sensor recovered.
        Fans:monitor recovered.
        Fans:normal.
```

- The output shown below displays on your console when the system reaches a critical state:

```
Router# show environment
Temperature:
        Temperature Reading:
                Temperature at inlet is measured as 62C/143F.
```

```
                Temperature at outlet is measured as 74C/165F.
        Temperature State:
                Temperature is in critical state.
        DFC Busyout/Power-down:
                A DFC is powered down. Slot:1, Type:NP108 DFC
                A DFC is busyout. Slot:2, Type:T1 8 PRI DFC
                A DFC is busyout. Slot:3, Type:NP108 DFC
Fans:
        Fans temperature delta is measured as 6C.
        All fans are running well.
Power Supply:
        Redundant Power System is present.
        RPS Input Voltage status: normal
        RPS Output Voltage status: normal
        RPS Fan status: normal
        RPS Thermal status: normal
        RPS OverVoltage status: normal
Environmental monitor experienced the following events:
        Temperature:sensor failed.
        Fans:monitor dropped.
        Temperature:warning.
        Temperature:sensor recovered.
        Fans:monitor recovered.
        Fans:normal.
        Temperature:critical.
```

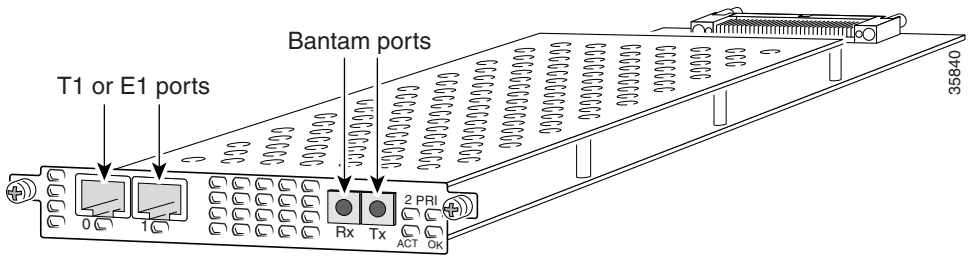
- The output shown below displays on your console when the system reaches a shutdown state:

```
Router# show environment
Temperature:
        Temperature Reading:
                Temperature at inlet is measured as 70C/158F.
                Temperature at outlet is measured as 82C/179F.
        Temperature State:
                Temperature is in shutdown state.
        DFC Busyout/Power-down:
                A DFC is powered down. Slot:1, Type:NP108 DFC
                A DFC is powered down. Slot:2, Type:T1 8 PRI DFC
                A DFC is powered down. Slot:3, Type:NP108 DFC
Fans:
        Fans temperature delta is measured as 6C.
        All fans are running well.
Power Supply:
        Redundant Power System is present.
        RPS Input Voltage status: normal
        RPS Output Voltage status: normal
        RPS Fan status: normal
        RPS Thermal status: normal
        RPS OverVoltage status: normal
Environmental monitor experienced the following events:
        Temperature:sensor failed.
        Fans:monitor dropped.
        Temperature:warning.
        Temperature:sensor recovered.
        Fans:monitor recovered.
        Fans:normal.
        Temperature:critical.
        Temperature:shutdown.
```

Using the Bantam Jack Ports to Monitor T1, E1, and CT3 Feature Cards

Monitor mode is available on the T1, E1, and CT3 feature cards. If a T1 controller does not come up, or if a large number of errors are associated with a particular controller, you might be able to use the test port to determine whether the problem is in the feature card or in an external T1 line. by using the test port. The test port is a set of bantam jack ports located on the front panel of the T1, E1, and CT3 feature cards. (See Figure 7-7.)

Figure 7-7 Bantam Jack Ports



In monitor mode, you can monitor only the ingress side of the T1 line without disrupting that line.

The bantam jack ports located on the front panel of the feature cards allow the connection of an external test device (for example, a FIREBERD test device) to monitor the individual T1 circuits in monitor mode. Use software commands to select a T1 line. For information on software commands, see the *Cisco AS5350XM and Cisco AS5400XM Universal Gateways Software Configuration Guide*.

Passive monitoring equipment is used to listen on the TX MON and RX MON jacks during regular operation to detect T1 errors.

Connecting test equipment to the following bantam jack ports provides various functions:

- TX MON can monitor signals coming out of the test port without interrupting normal data transmission.
- RX MON can monitor signals going in to the test port without interrupting normal data transmission.

Using Drop and Insert Mode on the CT3 Feature Card

The bantam jack ports located on the front panel of the CT3 feature card allow the connection of an external test device (for example, a FIREBERD test device) to test any of the 28 individual T1 circuits in drop and insert mode. Once drop and insert mode is enabled, a T1 circuit can be dropped out of service by using the push button on the CT3 feature card.

The **test trunk drop-insert** privileged EXEC command is used to enable or disable drop and insert mode on a T3 controller. When the system initially boots up, the drop and insert mode is disabled on all T3 controllers.

To drop a T1 circuit to a test port, follow these steps:

Step 1 Enable drop and insert mode by entering the **test trunk drop-insert on** *port-number* privileged EXEC command as follows:

```
Router# test trunk drop-insert on port-number
```

Note The *port-number* is the T1 circuit that you wish to drop. T1 port numbers range from 1 to 28.

Step 2 Disable drop and insert mode after testing the T1 circuits.

Note We recommend that you disable drop and insert mode to prevent accidental use of the push button on the CT3 feature card.

To disable drop and insert mode, enter the **test trunk drop-insert off** *port-number* privileged EXEC command as follows:

```
Router> test trunk drop-insert off port-number
```

Troubleshooting Network Interfaces

For information about isolating problems with the network connections to your universal gateway, see the *Internetwork Troubleshooting Guide* publication available on Cisco.com.

Getting Help

For information about technical support, onsite service, and exchange and repair services, see the "Obtaining Technical Assistance" section on page xvi.

Cabling Specifications

This appendix provides cabling and pinout information for feature cards on the Cisco AS5350XM and Cisco AS5400XM universal gateways. It contains the following sections:

- 2-Port and 4-Port T1 or E1 Feature Card Cable and Port Pinouts, page A-1
- 8-Port T1 or E1 Feature Card Cable and Port Pinouts, page A-6
- CT3 Feature Card Cable and Port Pinouts, page A-12
- Bantam Jack Port Pinouts, page A-13

Note This appendix specifies pinouts only for the pins used. Pins not listed in the tables in this appendix are not connected.

2-Port and 4-Port T1 or E1 Feature Card Cable and Port Pinouts

Table A-1 lists the T1 or E1 feature card port pinouts.

Table A-1 T1 or E1 Feature Card Port Pinouts

RJ-45 Pin	Description
1	RX tip
2	RX ring
3	RX shield
4	TX tip
5	TX ring
6	TX shield
7	—
8	—

Table A-2 lists the cable assemblies available for the T1 and E1 feature cards.

Table A-2 T1 and E1 Cable Assemblies

Cable Description	Part Number	Product Number
RJ-45 to DB-15	72-1336-01	CAB-E1-RJ45DB15
RJ-45 to DB-15 null	72-1337-01	CAB-E1-RJ45DB15N
RJ-45 to BNC	72-1338-01	CAB-E1-RJ45BNC
RJ-45 to twinax	72-1339-01	CAB-E1-RJ-45TWIN
RJ-45 to RJ-45TE	72-1340-01	CAB-E1-RJ45TE
RJ-45 to RJ-45NT	72-1341-01	CAB-E1-RJ45NT
RJ-45 to RJ-45T1	72-1342-01	CAB-E1-RJ45RJ45
RJ-45 to bare wire	72-1343-01	CAB-T1-RJJ45BARE

Figure A-1 through Figure A-5 show the types of cables that can connect to the RJ-45 connector on the T1 or E1 feature card.

Figure A-1 RJ-45-to-DB-15 Cable Assembly

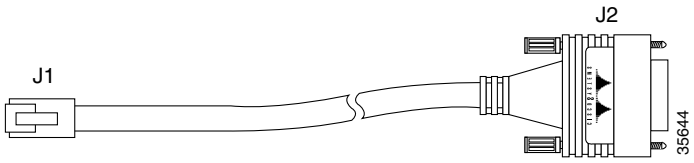


Table A-3 lists the RJ-45-to-DB-15 cable pinouts.

Table A-3 RJ-45-to-DB-15 Cable Pinouts

RJ-45 Pin	Signal	Description	Direction	DB-15 Pin
Shield	Ground	Shell/Braid		Shell
J1-1	RX Tip	Twisted Pair #1	<—	J2-3
J1-2	RX Ring	Twisted Pair #1	<—	J2-11
J1-3	RX Shield	Twisted Pair #3		J2-4
J1-4	TX Tip	Twisted Pair #2	—>	J2-1
J1-5	TX Ring	Twisted Pair #2	—>	J2-9
J1-6	TX Shield	Twisted Pair #4		J2-2

Table A-4 lists the RJ-45-to-DB-15 null modem cable pinouts.

Table A-4 RJ-45-to-DB-15 Null Modem Cable Pinouts

RJ-45 Pin	Signal	Description	Direction	DB-15 Pin
Shield	Ground	Shell/Braid		Shell
J1-1	RX Tip	Twisted Pair #1	<—	J2-1

Table A-4 RJ-45-to-DB-15 Null Modem Cable Pinouts (continued)

RJ-45 Pin	Signal	Description	Direction	DB-15 Pin
J1-2	RX Ring	Twisted Pair #1	<—	J2-9
J1-3	RX Shield	Twisted Pair #3		J2-2
J1-4	TX Tip	Twisted Pair #2	—>	J2-3
J1-5	TX Ring	Twisted Pair #2	—>	J2-11
J1-6	TX Shield	Twisted Pair #4		J2-4

Figure A-2 RJ-45-to-BNC Cable Assembly for 75-Ohm, Unbalanced Connections

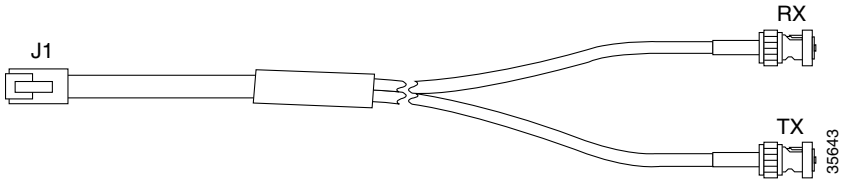


Table A-5 lists the RJ-45-to-BNC cable pinouts.

Table A-5 RJ-45-to-BNC Cable Pinouts

RJ-45 Pin	Signal	Description	Direction	BNC Pin
Shield	Ground	Shell		RX, TX Shields
J1-1	RX Tip	Twisted Pair #1	<—	RX-Tip
J1-2	RX Ring	Twisted Pair #1	<—	RX-Shield
J1-3	RX Shield	Twisted Pair #3		RX-Shield
J1-4	TX Tip	Twisted Pair #2	—>	TX-Tip
J1-5	TX Ring	Twisted Pair #2	—>	TX-Shield
J1-6	TX Shield	Twisted Pair #4		TX-Shield

Figure A-3 RJ-45 to Twinax Cable Assembly for 120-Ohm, Balanced Connections

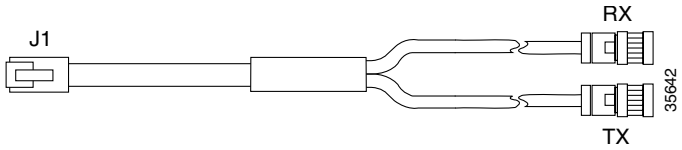


Table A-6 lists the RJ-45 to twinax cable pinouts.

Table A-6 RJ-45 to Twinax Cable Pinouts

RJ-45 Pin	Signal	Description	Direction	Twinax Pin
Shield	Ground	Shell		RX, TX Shields
J1-1	RX Tip	Twisted Pair #1	<—	RX-1
J1-2	RX Ring	Twisted Pair #1	<—	RX-2

Table A-6 RJ-45 to Twinax Cable Pinouts (continued)

RJ-45 Pin	Signal	Description	Direction	Twinax Pin
J1-3	RX Shield	Twisted Pair #3		RX Shield
J1-4	TX Tip	Twisted Pair #2	—>	TX-1
J1-5	TX Ring	Twisted Pair #2	—>	TX-2
J1-6	TX Shield	Twisted Pair #4		TX Shield

Figure A-4 RJ-45-to-RJ-45 Cable Assembly

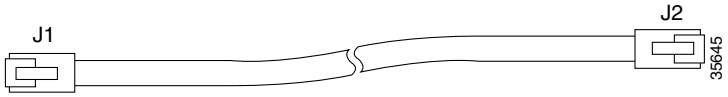


Table A-7 lists the RJ-45-to-RJ-45 TE cable pinouts.

Table A-7 RJ-45-to-RJ-45 TE Cable Pinouts

RJ-45 Pin	Signal	Description	Direction	RJ-45 TE Pin
Shield	Ground	Shell/Braid		Shield
J1-1	RX Tip	Twisted Pair #1	<—	J2-1
J1-2	RX Ring	Twisted Pair #1	<—	J2-2
J1-3	RX Shield	Twisted Pair #3		J2-3
J1-4	TX Tip	Twisted Pair #2	—>	J2-4
J1-5	TX Ring	Twisted Pair #2	—>	J2-5
J1-6	TX Shield	Twisted Pair #4		J2-6

Table A-8 lists the RJ-45-to-RJ-45 NT cable pinouts.

Table A-8 RJ-45-to-RJ-45 NT Cable Pinouts

RJ-45 Pin	Signal	Description	Direction	Signal	RJ-45 NT Pin
Shield	Ground	Shell/Braid		Ground	Shield
J1-1	RX Tip	Twisted Pair #1	<—	TX Tip	J2-4
J1-2	RX Ring	Twisted Pair #1	<—	TX Ring	J2-5
J1-3	RX Shield	Twisted Pair #3		TX Shield	J2-6
J1-4	TX Tip	Twisted Pair #2	—>	RX Tip	J2-1
J1-5	TX Ring	Twisted Pair #2	—>	RX Ring	J2-2
J1-6	TX Shield	Twisted Pair #4		RX Shield	J2-3

Note Because the RJ-45-to-RJ-45 cable has polarity, the pinouts differ depending on which end of the cable you use.

Table A-9 lists the RJ-45-to-RJ-45 T1 cable pinouts.

Table A-9 RJ-45-to-RJ-45 T1 Cable Pinouts

RJ-45 Pin	Signal	Description	Direction	RJ-45 T1 Pin
Shield	Ground	Shell/Braid		Shield
J1-1	RX Tip	Twisted Pair #1	<—	J2-1
J1-2	RX Ring	Twisted Pair #1	<—	J2-2
J1-3	RX Shield			
J1-4	TX Tip	Twisted Pair #2	—>	J2-4
J1-5	TX Ring	Twisted Pair #2	—>	J2-5
J1-6	TX Shield			

Figure A-5 RJ-45 to Bare Wire Cable Assembly

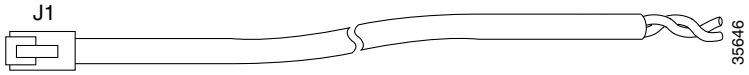


Table A-10 lists the RJ-45 to bare wire cable pinouts.

Table A-10 RJ-45 to Bare Wire Cable Pinouts

RJ-45 Pin	Signal	Description	Direction	Bare
Shield	Ground	Braid		
J1-1	RX Tip	Twisted Pair #1	<—	WIRE-1
J1-2	RX Ring	Twisted Pair #1	<—	WIRE-2
J1-3	RX Shield			
J1-4	TX Tip	Twisted Pair #2	—>	WIRE-3
J1-5	TX Ring	Twisted Pair #2	—>	WIRE-4
J1-6	TX Shield			

8-Port T1 or E1 Feature Card Cable and Port Pinouts

Figure A-6 shows a diagram of the 8-port T1 or E1 feature card cable assembly.

Figure A-6 8-Port T1 or E1 Feature Card Cable Assembly

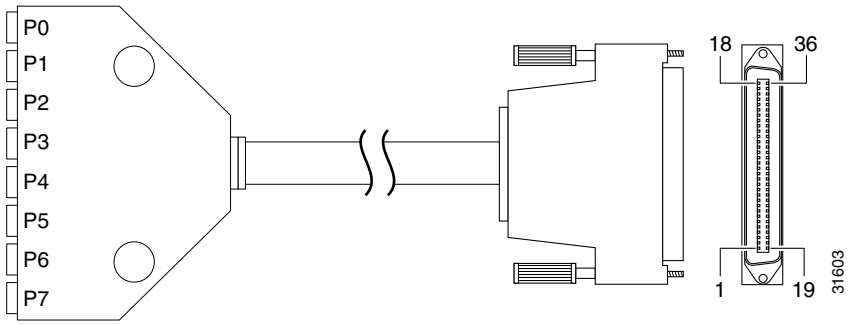


Table A-11 lists the 8-port T1 or E1 feature card cable pinouts.

Table A-11 8-Port T1 or E1 Feature Card Cable Pinouts

Female RJ-45 (CAB-DFC-OCTAL-xMF)					
From	**Signal**	**Note**	**Direction**	**Signal**	**To**
SHELL	GROUND	SHELL/BRAID		GROUND	SHELL
J1-1	RX_TIP	Twisted pair #1	<------	RX_TIP	J9-1
J1-2	RX_RING	Port 7	<------	RX_RING	J9-2
J1-3	RX_TIP	Twisted pair #1	<------	RX_TIP	J8-1
J1-4	RX_RING	Port 6	<------	RX_RING	J8-2
J1-5	RX_TIP	Twisted pair #1	<------	RX_TIP	J7-1
J1-6	RX_RING	Port 5	<------	RX_RING	J7-2
J1-7	RX_TIP	Twisted pair #1	<------	RX_TIP	J6-1
J1-8	RX_RING	Port 4	<------	RX_RING	J6-2
J1-9	No Connect	—	—	No Connect	—
J1-10	No Connect			No Connect	
J1-11	RX_TIP	Twisted pair #1	<------	RX_TIP	J5-1
J1-12	RX_RING	Port 3	<------	RX_RING	J5-2
J1-13	RX_TIP	Twisted pair #1	<------	RX_TIP	J4-1
J1-14	RX_RING	Port 2	<------	RX_RING	J4-2
J1-15	RX_TIP	Twisted pair #1	<------	RX_TIP	J3-1
J1-16	RX_RING	Port 1	<------	RX_RING	J3-2
J1-17	RX_TIP	Twisted pair #1	<------	RX_TIP	J2-1
J1-18	RX_RING	Port 0	<------	RX_RING	J2-2
J1 connector is male 36-position plug, J2–J9 connectors are female RJ-45 receptacles					

Table A-11 8-Port T1 or E1 Feature Card Cable Pinouts (continued)

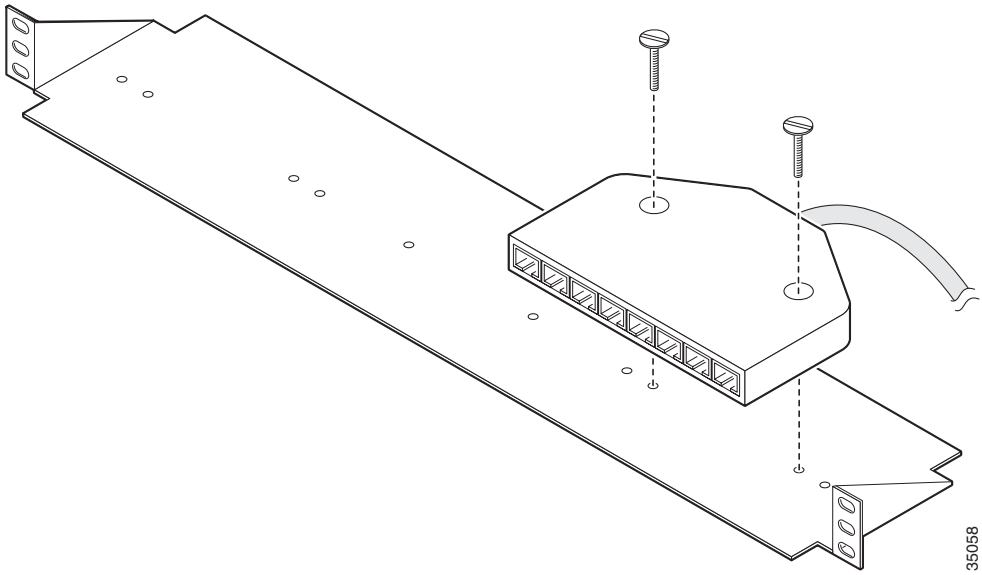
Female RJ-45 (CAB-DFC-OCTAL-xMF)					
From	**Signal**	**Note**	**Direction**	**Signal**	**To**
J1-19	TX_TIP	Twisted pair #2	------>	TX_TIP	J9-4
J1-20	TX_RING	Port 7	------>	TX_RING	J9-5
J1-21	TX_TIP	Twisted pair #2	------>	TX_TIP	J8-4
J1-22	TX_RING	Port 6	------>	TX_RING	J8-5
J1-23	TX_TIP	Twisted pair #2	------>	TX_TIP	J7-4
J1-24	TX_RING	Port 5	------>	TX_RING	J7-5
J1-25	TX_TIP	Twisted pair #2	------>	TX_TIP	J6-4
J1-26	TX_RING	Port 4	------>	TX_RING	J6-5
J1-27	No Connect	—	—	No Connect	—
J1-28	No Connect			No Connect	
J1-29	TX_TIP	Twisted pair #2	------>	TX_TIP	J5-4
J1-30	TX_RING	Port 3	------>	TX_RING	J5-5
J1-31	TX_TIP	Twisted pair #2	------>	TX_TIP	J4-4
J1-32	TX_RING	Port 2	------>	TX_RING	J4-5
J1-33	TX_TIP	Twisted pair #2	------>	TX_TIP	J3-4
J1-34	TX_RING	Port 1	------>	TX_RING	J3-5
J1-35	TX_TIP	Twisted pair #2	------>	TX_TIP	J2-4
J1-36	TX_RING	Port 0	------>	TX_RING	J2-5
J1 connector is male 36-position plug, J2–J9 connectors are female RJ-45 receptacles					

Attaching the 8-Port T1 or E1 Feature Card Interface Cable to a Bracket (Optional)

To attach the 8-port T1 or E1 cable to a bracket:

Step 1 Place the molded RJ-45 end of the cable on the bracket with the RJ-45 ports facing you. Align the two holes on the molded RJ-45 end of the cable with the holes on the bracket. (See Figure A-7.)

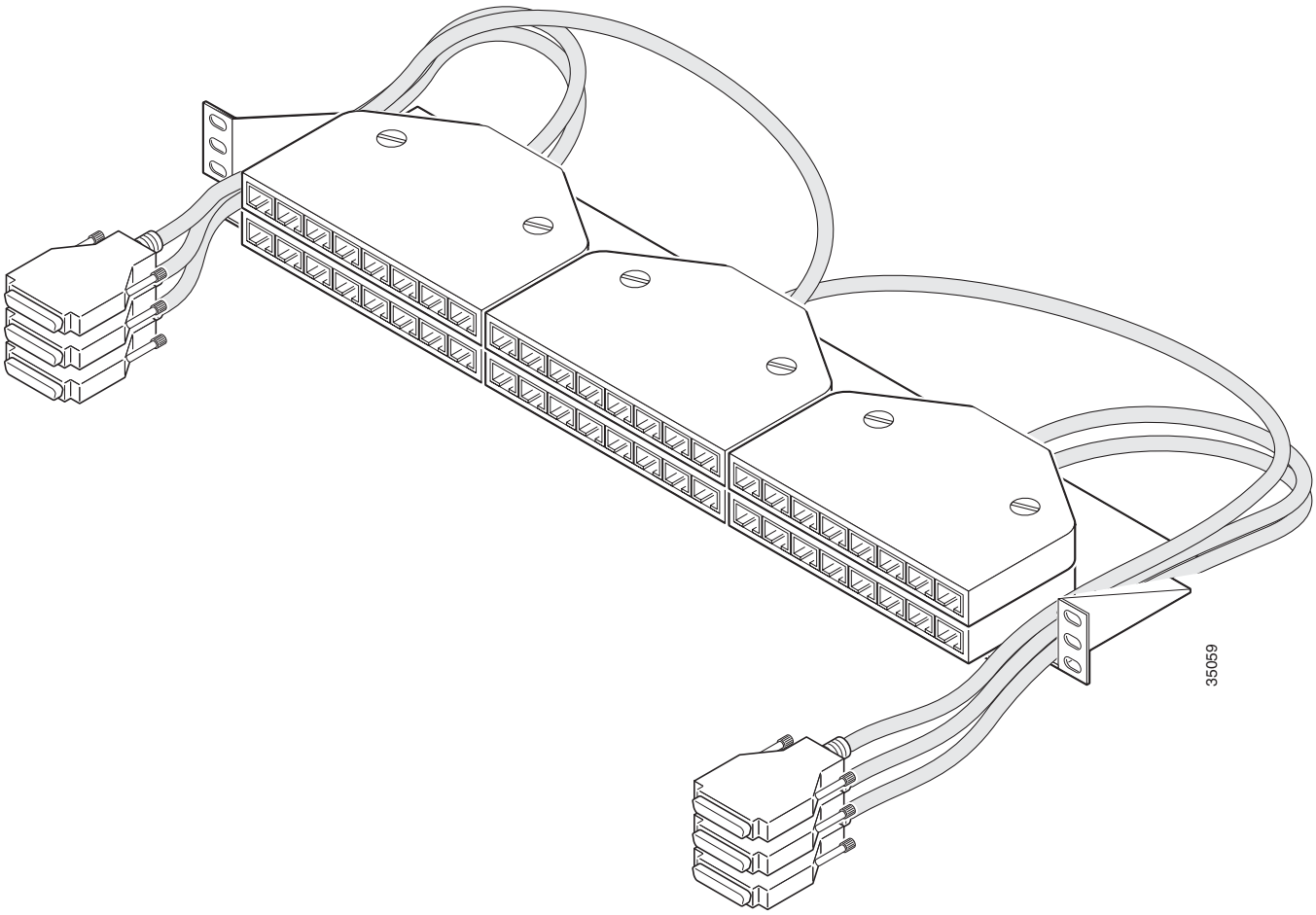
Figure A-7 Placing the Molded RJ-45 End of the Cable on the Bracket



Step 2 You can align the molded RJ-45 ends of the cables in one of the following ways:

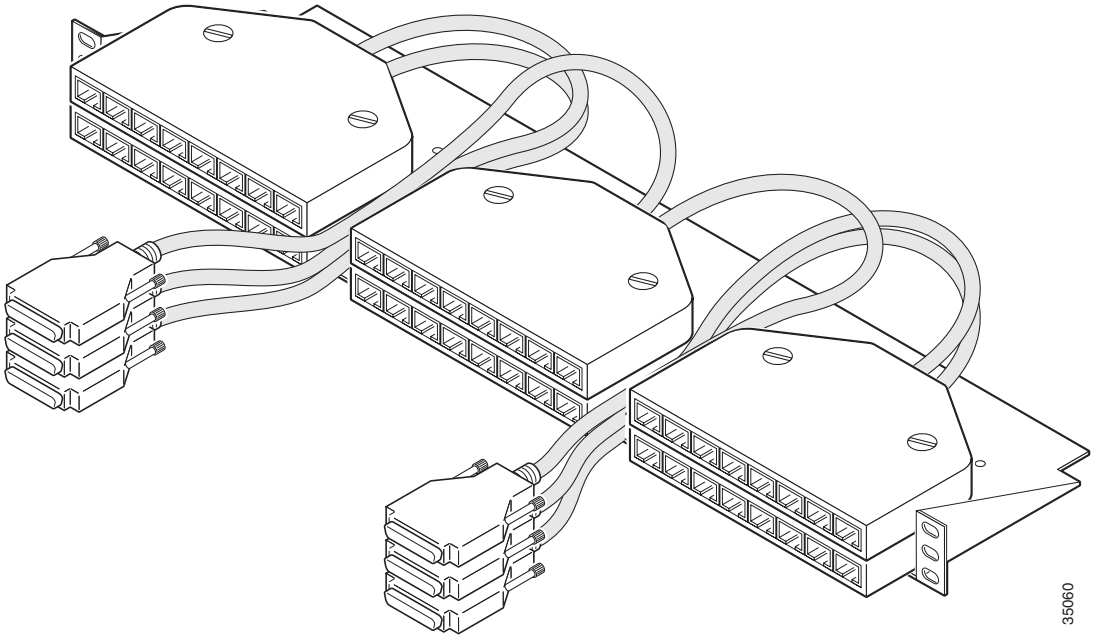
- Place the molded RJ-45 ends of the cables next to each other. This placement creates space between the last molded RJ-45 end of the cable and the edge of the bracket adjacent to it. Route the cables through this space. (See Figure A-8.)

Figure A-8 Routing Cables with Molded RJ-45 Ends of Cables Next to Each Other



- Align the molded RJ-45 ends of the cables with an opening between the adjacent molded RJ-45 ends of the cable. Route the cables through the openings. (See Figure A-9.)

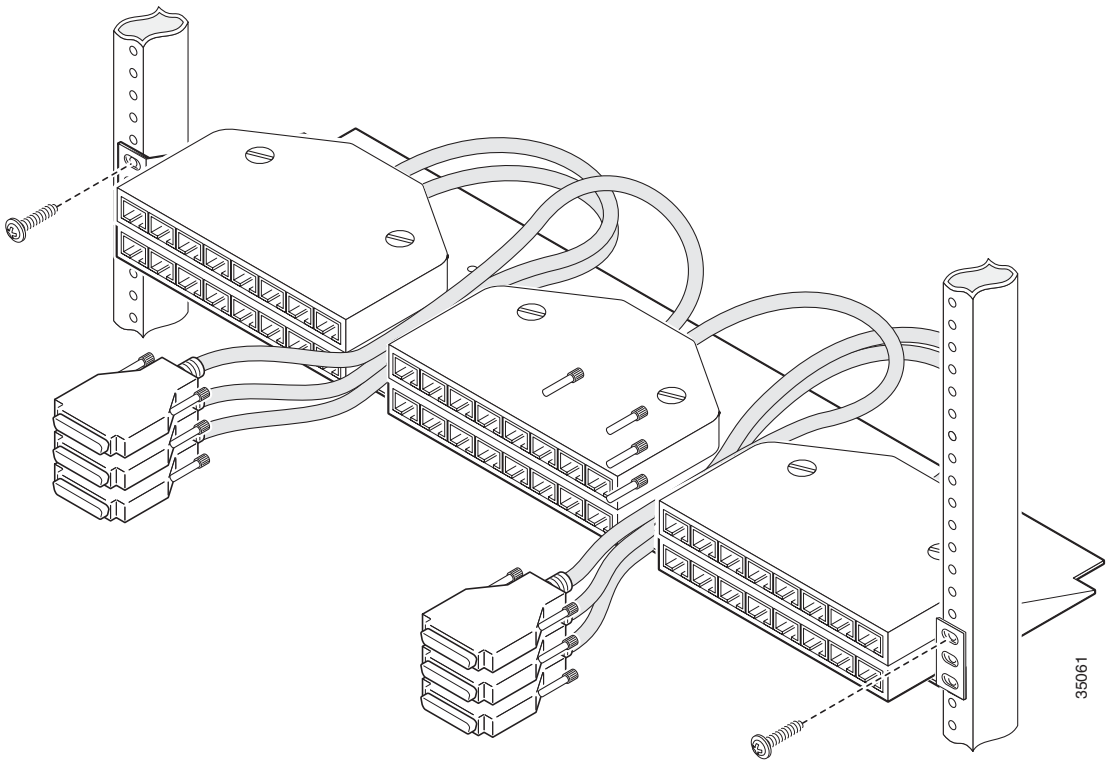
Figure A-9 Routing Cables with Molded RJ-45 Ends of Cables Flush with Bracket Edges



Step 3 Secure the molded RJ-45 ends of the cables to the bracket with the provided flathead screws. (See Figure A-10.)

Note To secure a single molded RJ-45 end of the cable, use the short flathead screws. To secure two (stacked) molded RJ-45 ends of the cables, use the long flathead screws.

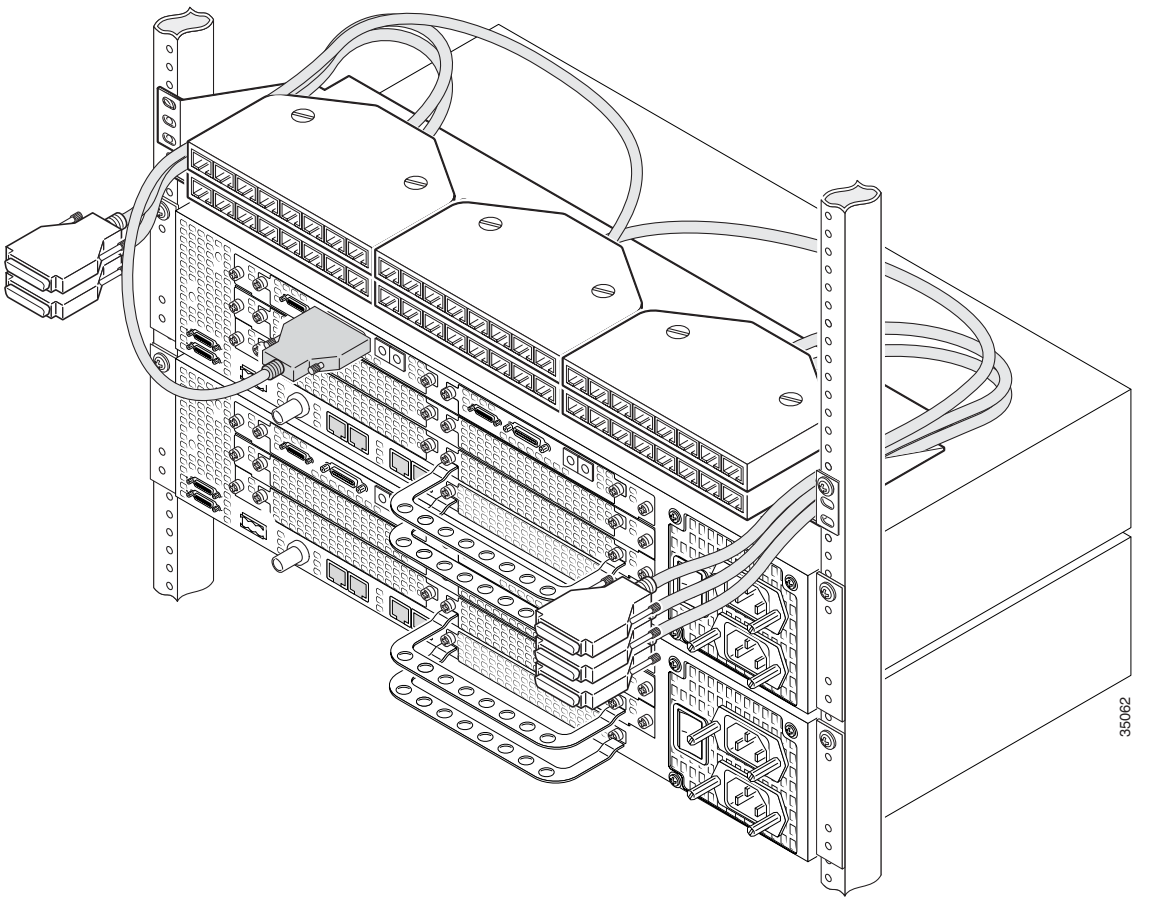
Figure A-10 Securing the Cable Bracket to the Rack



Step 4 Use the end screws on the bracket to secure the cable bracket to the rack. (See Figure A-10.)

Step 5 Insert the 36-pin cable connector into the 36-pin port on the 8-port T1 or E1 feature card. Tighten the captive screws on the 36-pin cable connector to secure the cable to the feature card. (See Figure A-11.)

Figure A-11 Connecting the 36-Pin Cable Connector to an 8-Port T1 or E1 Feature Card



CT3 Feature Card Cable and Port Pinouts

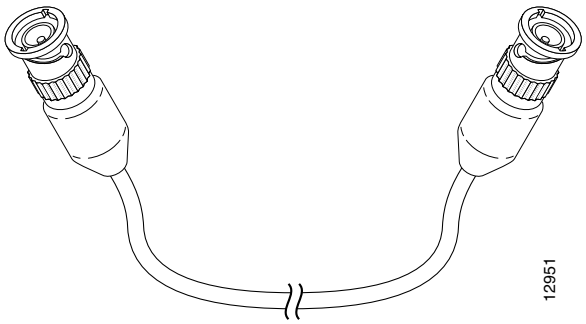
Table A-12 lists the CT3 feature card port pinouts.

Table A-12 CT3 Feature Card Port Pinouts

Pin	Description
Receiver port (on the left)	
1	Rx signal
2	Ground
Transmitter port	
1	Tx signal
2	Ground

Figure A-12 shows a diagram of the CT3 feature card cable assembly.

Figure A-12 CT3 Feature Card Cable Assembly



Bantam Jack Port Pinouts

Table A-13 lists the bantam jack port pinouts.

Table A-13 Bantam Jack Port Pinouts

Pin	Description
1	Tip
2	Ring

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